LAST FITTING

AND

PATTERN CUTTING

diagramma

3256
RRR

LAST-FITTING

AND

PATTERN-CUTTING

A SCIENTIFIC AND PRACTICAL TREATISE ON

Modern Shoe Manufacturing.

(ILLUSTRATED BY DIAGRAMS).

BY

ALFRED HANNIBAL

("MANAGER"),

Author of "A Start in Business," etc., etc.

LATE TECHNICAL INSTRUCTOR IN SHOEMAKING AT THE POLYTECHNIC INSTITUTION.

(*Third Edition*).

Reprinted from the "Boot & Shoe Trades Journal."

London:

THE LEATHER TRADES PUBLISHERS, LIMITED,

9 AND 10, ST. BRIDE'S AVENUE, FLEET STREET, LONDON, E.C.

1888.

ORIGINAL PREFACE.

THE very flattering reception that was given to the series of papers on "Last-fitting and Pattern-cutting," which, under the *non de plume* of "Manager," I contributed to the BOOT AND SHOE TRADES JOURNAL, may be taken as sufficient warrant for the publication of the series in book form. The want of a text-book dealing with the important subjects which are treated of herein, is, I believe, widely felt. My design has been to lay down a groundwork, based upon human necessity, or what may otherwise be described as natural law, and upon this to erect the framework of a system that may fairly claim to be termed a scientific one. The methods and rules set forth are the results of many years practical working out, and have, all of them, been subjected to the continuous tests involved in their application to the every-day routine of the factory and workshop. Therefore, I believe they may be taken in all confidence as safe guides to the student, both in the technical class and in the workshop, and will prove of not less value to all persons who may in any way be responsible for the efficiency and suitability of the foot-wear of the public. I have endeavoured to set forth my views in as plain and concise a manner as possible, and to deal comprehensively with each subject; but should I have failed at any point to make my meaning clear, I shall be pleased to give the further explanation necessary in the same columns in which the papers originally appeared.

With this preface I beg to subscribe myself the reader's devoted and humble servant,

ALFRED HANNIBAL.

757140

NOTE.—The plates given with this work have been reduced from those originally published in the BOOT AND SHOE TRADES JOURNAL. *To ascertain the full size of the patterns and diagrams, it is, therefore, necessary to multiply all the measurements by two. This rule, however, does not apply to the plate representing a long boot, which it was necessary to reduce four times; therefore, to ascertain the correct size of this pattern, the measurements must be multiplied by four instead of two.*

CONTENTS.

	PAGE
The Physiological Principles of Boot-making	1
The Necessity of Ease, and the Treatment of Weak Ankles	10
Measurements.	22
The Preparation of Lasts in Sets	42
Sole and Insole Patterns	49
The General Principles of Upper Patterns	55
Pattern-Cutting	65
To Grade Upper Patterns	71
On Grading Fittings	76
Side-Spring Patterns	83
Long Work	88
To Cut Shoes.	95
Conclusion	101

A TECHNICAL

Handbook for Students.

Now Ready, in Cloth Boards or Limp Cloth,
Fully Illustrated, Price 4s.

A MANUAL

OF

Boot & Shoe Manufacture,

By **HERBERT HILL** (First Honours Medallist; Technical Instructor at the People's Palace; Assistant Lecturer, Polytechnic Institute; Certificated Science Teacher); and **HENRY YEOMAN** (First Honours Medallist; Certificated Science Teacher.

CONTENTS:

Introductory Preface.—The Anatomy and Physiology of the Foot.—Geometrical Preliminaries.—Measure.—On Sole Shapes; rules for their scientific preparation.—The Principles of Pattern-Cutting.—The Elements of Clicking.—On Fitting and Closing.—Rough Stuff Cutting.—Bottoming by Hand and Machine Processes.—Finishing, and the Kit Employed.—A Consideration of Boot and Shoe Machinery.

PUBLISHED BY THE LEATHER TRADES PUBLISHERS, LIMITED,
9 & 10, ST. BRIDE'S AVENUE, FLEET STREET, E.C.

THE

BOOT & SHOE TRADES JOURNAL.

THE LEADING ORGAN OF THE LEATHER TRADES.

THE BOOT AND SHOE TRADES JOURNAL is conducted for practical men by practical men, and employs a larger staff of technical and other writers than any similar paper in the world. Its circulation and influence has reached a point never before attained in the history of trade journalism, and its progress is constant.

Articles appear every week on Technical Subjects, written by some of the best experts in the Trade.

Full and detailed information is given weekly of the FAILURES IN THE BOOT AND LEATHER TRADES, together with LISTS OF CREDITORS. This department is not confined to public Bankruptcy Proceedings, but includes PRIVATE ARRANGEMENTS, intelligence of which seldom fails to reach the Journal through its numerous correspondents.

The Journal is the recognised medium of communication for Employers requiring Travellers, Foremen, and Workmen, and *vice versa*. Advertisements must arrive at the London Office not later than WEDNESDAY Morning. Terms (which are in all cases prepaid):—Twenty words, 1s., and 6d. extra for every ten words afterwards; three insertions for price of two. Replies may be addressed to the office, and forwarded for a fee of 6d., to cover postage.

The Boot and Shoe Trades Journal

Can be obtained to order from all Newsagents. Weekly, 2d. Postal Subscription (in advance), 10s. per annum; 2s. 9d. per quarter. Foreign Subscription, 12s. per annum.

OFFICES: 9 & 10, St. Bride's-avenue, Fleet-street, London, E.C.

LAST-FITTING

AND

PATTERN-CUTTING.

CHAPTER I.

THE PHYSIOLOGICAL PRINCIPLES OF BOOT-MAKING.

THE business of bootmaking may, at the present time, be divided into two clear and defined sections — that which deals with the principles of the trade, and that appertaining to the mere manipulation of leather into boots. With the latter of these departments it is not the purpose of this treatise to deal, except in so far as may be necessary to elucidate the former; for, although bad workmen are plentiful, yet there are not wanting men thoroughly competent to direct them in better ways, when details and technicalities are alone at fault. I apprehend, moreover, that those who really take an interest in their business are tolerably proficient in its mere executive functions. To dilate, therefore, upon that portion of the subject would not only be superfluous,

but impertinent. But, unfortunately, the tendency of modern business has not been towards knowledge where principles were concerned, although time and money have been squandered lavishly upon styles and trivialities. I think, therefore, that a greater perception of the requirements of the human foot is necessary; and it is with the object of imparting the necessary knowledge in this respect that I have been induced to write the present treatise. What is required at the present day is that a truer, broader grasp of the principles of the business should be taken by those who conduct it; and a glance at the field I propose to explore will show more fully the broadness of view which I wish to inculcate.

I therefore propose, in the first place, to direct attention to the normal condition of the human foot, its anatomical construction, the natural form and functions of that much injured, long-suffering, little-understood, but most valuable portion of the human frame, with an idea of removing from it, in some degree, the tortures to which a complacent public have for ages condemned it, by the ill-conditioned and barbarously-shaped boots and shoes it has been covered with.

I shall also have something to say respecting the feet of infants and young children, with the proper treatment of the complaint of weak ankles, which is so frequently observable among the juvenile portion of the community. I shall likewise have a word to say to medical men, showing the fallacy of their treatment in the majority of these cases, where art has to be brought to bear to remedy

natural defects, and shall demonstrate how often practical experience upsets the doctor's theories.

I shall then follow on with directions for taking measures for every class of boots and shoes, with directions for shaping and fitting up lasts for the hand-sewn trade, and also for shaping models for the manufacturer. In these respects I shall most undoubtedly submit myself to severe criticism, when I assail some honest old prejudice that has been nursed and cherished for years. Men will not submit tamely to have their own little hobbies upset. The hobbies they ride they are for too prone to look upon as the best the world ever produced. But if I do not succeed in unhorsing this class, I hope to prevent many others from mounting the same kind of animal. The systems I shall advocate are no mere theories, but the result of a long and successful experience for upwards of a quarter of a century. Their exposition will, I believe, show them to be opposed almost entirely to the generally preconceived notions of the trade. Almost everything relating to the comfort of the foot depends upon the shape of the last. In this particular I have been no less surprised than pained to find men who appear to be standing somewhat high in the medical profession, recommending shapes for the soles of boots as unsuited for the human foot, as Queen Elizabeth's frill would be for a horse's collar. I may at once admit that I always look with considerable suspicion upon anything recommended by the Faculty; and think that to run after a doctor to get a

shape for the soles of boots and shoes, shows, to say the least, a most deplorable weakness on the part of bootmakers. My experience shows that the doctor, like the ever-present anatomical bootmaker, simply describes the shape of the foot (when in a standing position) upon a sheet of paper, and forgets altogether the tendencies of the foot when in the act of walking.

After the formation and fitting-up of the lasts have been dealt with, next in order I hope to give the method of cutting patterns to fit them. This in itself is a most important matter, most especially to young men who are desirous of perfecting themselves in the trade, and working up to a leading position therein.

This, together with a proper method of guaging patterns into sets, is a want very generally felt. There is no reason why all this work, which is now done in a haphazard or chance sort of way, should not, in common with almost everything else in connection with the trade, be subject to a few simple scientific rules. There was a time, not long past, but previous to the introduction of machinery into the trade, when Wellington and jockey boots, the Brunswick tie shoes, and ladies' slippers, as they were called, were the staple articles of production, with something like a recognised system for cutting them, but as these articles went out of date, the manufacturers chiefly went with them, leaving little, if any, trace of the conditions or methods by which their work was cut or their businesses managed. Perhaps it would be more germane to the

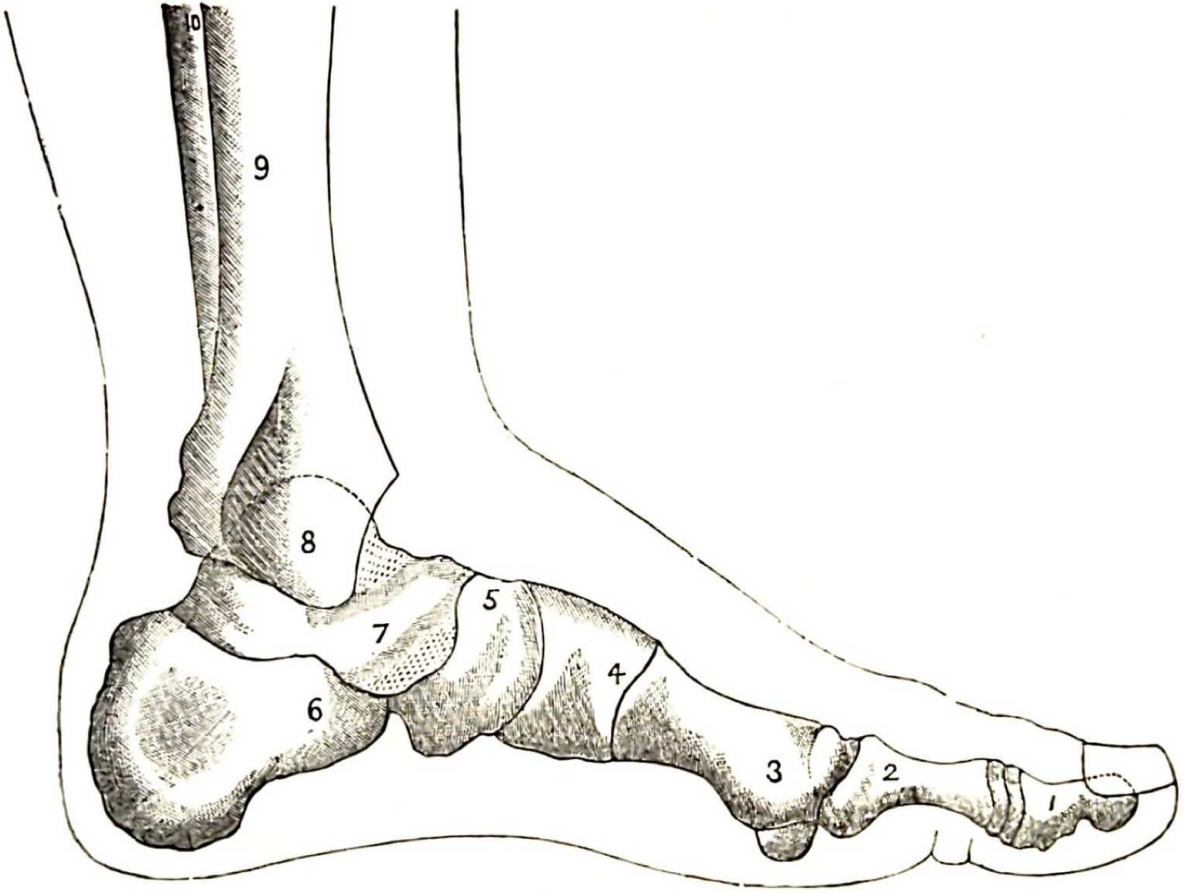

Fig 1.

matter to say that business was carried on too frequently without any management at all. Old systems are now buried in the past, and time—that great revolutionist—has created a new order of things, and surrounded us with circumstances differing entirely from the old past. A multiplicity of new designs are constantly being introduced into the trade, and competition runs at fever heat, calling for all the energy and skill which can be produced, and the full development and application of science in every department to which it can possibly be applied, to the beautifying and perfecting of every article manufactured.

At the close of a conversation I once held with a rising retail dealer, the subject having been the diversity of ideas, and so often the total absence of ideas, as to the forms and styles of work, he expressed himself in the following terms:—"For my own part I am not at all concerned about either style or form; I never studied it, and therefore do not profess to understand it. What I look out for is something tolerably solid, which can be worked off quickly. My aim is to make as much as I can out of the trade. It is a troublesome business at the best, and the sooner I retire from it, the better I shall like it." I have no doubt that my friend is the representative of a very large proportion of those engaged in the retail trade. And, looking at the matter from a purely commercial point of view, and stripping away every vestige of morality, perhaps little exception can be taken to his notions. But whilst this principal of carrying on a

business may pass muster with the mere speculator, it assumes a very different character with those who are professedly bootmakers, whose duty it is not only to give the public fair value for their money, but to supply them with articles suited in every way to the peculiar requirements of the human foot, which can be worn without giving any pain or discomfort to the wearer. For this to be done efficiently it must be assumed that the bootmaker understands something of the nature and functions of that part of the human body he seeks to clothe, and by which he expects to get his living. The tailor may make a coat or other garment unsightly to the eye, and not at all comfortable to wear; the head may be covered with an article not exactly becoming or suitable to the wearer; but here the matter ends. The bootmaker is in a very different position. When his goods fail to fulfil the purpose for which they are designed, they are not only unsightly, but positively painful, and frequently injure the wearer for life.

This is a matter which calls for the serious consideration of the whole bootmaking community. However much it may have been neglected in the past, it cannot be shelved much longer with impunity. The advanced intelligence of the age will naturally bring such questions to the front, and it will be seen that the comfort of a whole community cannot be trifled with. The bootmaking trade upon the Continent is becoming alive to this fact, more especially in Germany and Austria, where every effort is being made to instruct

those who wish to enter into the trade, as well as those already engaged in it, in the art of making, as well as in the fundamental and scientific rules which underlie the work. If the manufacturers of this country fail to read the signs of the times, and neglect the opportunities for improvement that are being constantly opened up to them, they must simply make way for the more practical and more enlightened, who will surely take their place.

In directing attention to the human foot, it is not only necessary to consider its form, but the work it has to do. The bootmaker has taken but a superficial view of its form and bearing, whilst the physiologist has merely described its wonderful anatomical construction, and between the two the foot is crucified. My own view is that the bootmaker should understand both.

A reference to the illustration (fig. 1) will show at once how important it is that the structure and functions in every particular of the human foot should be fully considered and understood by the bootmaker, who should take Nature for his guide, and use science as Nature's handmaid. There would then be little fear of his going wrong, and he would find that his handicraft had higher claims upon his intelligence than mere buying and selling. When he regards the symmetrical arch, formed by those seven irregular, movable bones, which run from the toe to the heel, bound together by ligaments, yet having practically the firmness of a single bone, and at the some time giving a wonderful degree of asticity and power to the instep and large toe, and

considers how the elastic tissue is interwoven and bound up with the numerous articulations, to prevent concussion of the various bones of the foot during the acts of walking, running, and jumping, he will see how necessary it is that the extremities should not be confined and the blood passages compressed, as they so often are. The instep makes the foot an elongated lever, which expands and contracts in the act of walking. Whenever this elasticity is found to be restrained or destroyed, from whatever cause it may be, walking becomes far more fatiguing, and frequently very painful. How many do we daily meet, who cannot be said to be walking, but clumping their feet upon the pavement as if they were but pieces of wood attached to stumps. At every step the heels come down with a thud, shaking the whole body, disturbing and weakening every joint, from the ankle to the hip. The functions of the instep are multifarious, being chiefly instrumental in keeping the body fairly balanced in all its varied movements. In walking, running, jumping, dancing, marching, fencing, or whatever the active position in which the body may be placed, the instep is the principal agent, and so important an actor that it certainly demands the most serious and careful consideration of those who supply the foot-gear.

The arch of the waist of a healthy and fully developed foot, in a standing position, is raised nearly half-an-inch at the centre, where the bones, numbered 4 and 5, are situated; but when proceeding to advance, one foot is

brought forward, the arch of the other foot instantly becomes more elevated, the muscles being braced up by the smaller toes gripping the surface upon which they are resting—a duty they never fail in when preserved in their normal state. This action is more pronounced when the body is supported upon one foot, in which position the arch is still more elevated, as it also is when, in the act of walking, the foot is being brought forward before it is planted on the ground. The whole weight of the body is then borne by the large toe of the other foot—and bones numbered 1 and 2—with an immense strain upon the instep.

I am very anxious that the reader should bear the above facts in mind, as they will be referred to in the further development of this matter.

CHAPTER II.

THE NECESSITY OF EASE, AND THE TREATMENT OF WEAK ANKLES.

IN the diagram which appeared in connection with the previous chapter, a side view or elevation of the inner side of the human foot was shown. The bones shown in this position of the foot were numbered, in order to make reference more easy by those who may not be acquainted with the anatomical terms by which they are known to the medical profession. Consideration of these outlines, and the remarks thereupon lead us to a further investigation of other and no less important parts of this wonderfully-constructed part of the human body.

The leg consists of three bones, known as the *patella*, the *tibia*, and the *fibula*. The *patella*, or knee-pan, is a small, flat, triangular bone, of a spongy texture, situate at the anterior part of the knee-joint, the *tibia*, the principal leg bone, being the second largest bone in the whole body (No. 9), is linked with a smaller one, the *fibula*. Its upper extremity is considerably smaller than the *tibia*, and placed below the level of the

knee joint! the lower extremity, however, projects below the *tibia*, and joins the outer ankle.

The knee joint is in form like a hinge, and shows a slight rotary motion when the leg is bent. Around this part, and immediately under and attached to the knee-pan, are the principal muscles which move the joints and serve to protect the parts against injury. The two leg bones (Nos. 9, 10) unite at the ankle with what are called the *tarsal* bones, seven in number, known as the *astragalus*, *os calcis*, *cuboid*, *scaphoid*, and three cuneiform bones. These, again, are united to the five *metatarsal* bones, which form the body of the foot, and to these, again, are joined the phalanges, or bones of the toes, fourteen in all, two of them being portions of the great toe, each of the other toes having three. The *os calcis* (No. 6) joins the *astragalus* or ankle bone (No. 7). forming, as it were, a keystone to the whole superstructure.

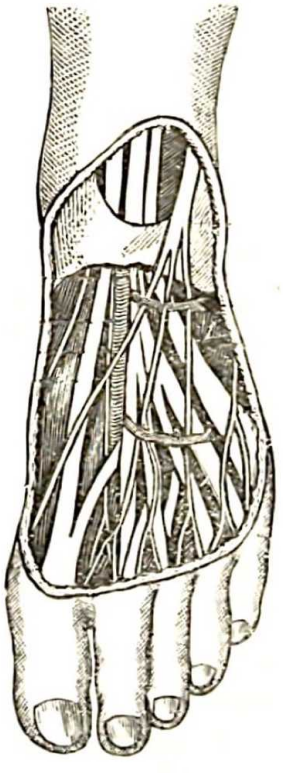

DIAGRAM OF FOOT WITH TENDONS PARTLY EXPOSED.

The chief instruments of motion are the muscles. When we consider the various positions in which the body is sustained by the foot, and sometimes that it has to bear astonishingly heavy loads, the agility and

quickness with which the most intricate movements are made, whether in exercise or in work, can only be described as marvellous. These muscles are of a reddish-brown colour, and consist of elastic fibres or threads arranged in some parts of the foot in layers in a straight line, but in other parts obliquely. Their elasticity is controllable at will. A muscle is generally thicker in the middle, and gradually tapering towards the extremities, and in many instances it passes at one or both ends into a tendon, or tough white substance, which is attached to a bone, and serves the same purpose as a rope or a cord to fix the muscles to the point which it is intended to actuate. The tendons are most numerous about the joints, yet they occupy but little space.

It will at once be seen that there is a vital necessity on the part of the bootmaker that he should provide for the free and undisturbed action of these delicate parts. The tendons are surrounded by numerous glands, constantly pouring out an oily substance, serving at once to lubricate the joints and facilitate the play of the tendons.

Two large muscles in the calf of the leg join to form what is technically known as the tendon of Achilles, which is attached to the *os calcis* heel-bone (No. 6). These muscles act in bending the ankle, and give grace to the body in walking. The foot and toes are moved by several long slender muscles situated in the leg, which have tendons attached to them, terminating on the toes.

There is yet another very important constituent, the

most delicate, and, at the same time, the most sensitive of all the agencies that go to make up the beautiful and wonderful mechanism of the human foot. There is no doubt that, notwithstanding all the discoveries of science, very little of the nervous system is understood. The nerves are soft, whitish-looking cords, which proceed from the brain and spinal marrow, and spread out in innumerable branches to every part of the body. The nerves are of a pulpy nature, but have a thin external covering to protect them. They appear to work from different centres, or stations, the sense of injury, for example, being conveyed from one station to the other until it reaches the brain, which at once directs instantaneous action. I know of no better way to describe the arrangement of the nervous system than by comparing it to our system of telegraphy, when a message is being sent from a local branch to the district office, and from thence transmitted to the Metropolis. The principal difference is that the wires in the latter are so much more sparingly laid than are the conductors in the human body. So close are they that a pin's point cannot be inserted in any part of the foot, or, indeed, in any part of the body, but it will come in contact with some of these little local messengers, who instantly report the fact to the nearest station, through which it is flashed up to the brain. Now, the reader must bear in mind that all these constituent parts which have been described as making up the total of the human foot, if they are to be kept in perfect and healthy action, will

need support, a constant and regular supply of nutriment, and of that kind most suitable to the sustenance of each. The blood is the agent by which all the solid and fluid parts of the body are supplied with nourishment, and the necessary material for increasing the bulk and repairing the waste, which takes place continually by perspiration, etc. Now, although many pages might be written, and possibly with advantage, upon this part of my subject, yet, as I wish to avoid confusing the mind of the beginner, I shall endeavour to confine my remarks to clear and simple facts, that all who read may understand. It must not be forgotten, however, that all these parts that I have mentioned, as well as many others, are all working in harmony one with the other, and are governed by immutable laws, these laws being so many commands to which man in all conditions is bound to conform, under an expressed penalty for their infraction. One may as well pretend to see clearly in the dark; to deprive oneself of air without being suffocated: or drink poison without injury, as attempt to infringe with impunity, any one of these laws by which the primitive and healthy state of the foot is preserved. Nature, like a fond mother, is ever ready to regain her erring children, and, with a warning voice, bid them beware; but if her commands are disregarded, she will bring down punishment upon them in exact proportion to the offence, never condoning it, but continuing mercilessly to torment the offender until her laws are obeyed. Let these facts, in connection with others that I shall introduce, be once

realised in the mind of the bootmaker; he will then approach his business with a sense of responsibiltity unknown to him before.

These particulars, though necessarily brief, should, nevertheless, be sufficient to convince the student that the utmost care is to be observed in clothing the human foot, if it is to retain perfect freedom of action. A foot-covering should be so shaped that no undue pressure should exist in any part whatever, as when this occurs, the necessary flow of blood is obstructed in its course. The consequence of this pressure is that coldness ensues, and thus the natural equilibrium of heat, so essential to the health of the whole body, is destroyed. And as truly as night follows day so does pain follow a loss of heat. As physiological science teaches us that heat is the first principle of life, so also does it teach us that the absence of heat is death.

There is no doubt in my mind that the time is fast approaching when a more enlightened public will be able to distinguish what is the most suitable shape and make of a boot for comfort. The bootmaker will then discover that a partial acquaintance, at least, with this science, more particularly as far as the foot is concerned, will be as necessary to his success in business as the material he uses. Of all the marvels of creation there is nothing more inexpressibly wonderful than the piece of mecanism called Man, sublimely depicted by our immortal bard, "Noble in reason, intimate in faculty, in form and moving how express and admirable, in action

how like an angel, in apprehension how like a god, the beauty of the world, the paragon of animals!"

When we become scientifically acquainted with the natural construction of the foot, neglected, crippled, and tortured as it is, and find it to be one of the leading characteristics that distinguishes man from the lower animals, causing him to look up and walk erect in the pride and dignity of his nature, we feel a sense of humiliation at the injury that has been wrought by the crass ignorance of the shoemaker who undertook to provide for it a suitable protective covering. It is simply by the structural economy of the human foot that man is enabled to stand upright, as no other animal can. In this position the compactness and strength of the foot gives man his power of locomotion as a biped, and, further, it is interesting to know that as the intellectual faculties of man are fully developed, so also does the symmetrical beauty of the foot improve in a somewhat corresponding degree. I may remark, parenthetically, that my readers must not interpret this as applying to distorted feet; otherwise some that come under our everyday observation would be indicative of serious mental derangement. I might, were it necessary, give a quantity of evidence from eminent members of the medical profession, showing how the general health is destroyed, and life actually shortened, through the physical and mental torture arising from tight and ill-shaped boots. I mention this simply because my own observation has convinced me how easily demon-

strable is this fact, though I do not rely very implicitly as a rule upon medical evidence.

This brings me to the consideration of another very important part of my subject—the treatment of weak ankles in infants and young children. On different occasions I have had to provide boots for the patients of two very eminent medical men belonging to totally different schools, and who appeared to view everything from entirely opposite standpoints — namely, the late Sir Benjamin Brodie and the late Dr. Young. The patients recommended to my treatment, with a few exceptions were children of from two to fifteen years of age, and I had, of course, to work out the instructions given me as accurately as possible. Thus I acquired the opportunity of testing, in a number of cases, the comparative merits of the methods employed to strengthen weak ankles, and put children firmly upon their feet. The one depended upon the use of high stiffenings, steel springs, and whalebone or bandages, as supplementary aids to Nature in doing her work. The other discarded all these things, and for a considerable time ordered only the very softest elastic to be inserted just above the stiffening, brought right round the back of the boots over the ankles, to within a short distance of the front seam, until, at my own suggestion, he discarded boots altogether ; and for all future cases of this kind shoes were made with the uppers of soft material, lacing up well on to the instep, and provided with soles of good substance, and with a top-pieced heel and very elastic waist. Thus was Nature

freed from restriction in her work, and with satisfactory results. The ankles of those children without bandages at all soon made rapid and perceptible improvement, becoming straight and strong; whilst the others became thinner and weaker, and made little or no progress; and I have no hesitation in saying that what little improvement was observable in some instances arose not from the tight bandages and pressure that was put upon them, but rather in spite of those appliances. There is a striking resemblance between doctors and shoemakers; neither work upon any fixed scientific principle, and, therefore, it is rare to find two agree upon any one single point. The one makes the boots, and feels confident of success when he receives the price for them; the other pours his medicine down his patients' throats, hoping for a favourable result, but really leaving this to chance. Both avoid Nature's school, and neglect the teachings that she is daily offering them.

There is a quaint anecdote in connection with the life of the Iron Duke that might be introduced here with a certain amount of appropriateness. A celebrated chiropodist, then established in Regent Street, asked the patronage of the duke, through a pretentious circular, and received from him the following laconic reply:— "The Duke of Wellington presents his compliments to Mr. ——, and begs to inform him that he (the duke) never had any corns to cut, that he never intends to have any, and, further, that they are only fools who do have them." One of my objects in writing these papers is to

enable those who read them to tell the public in full confidence that there is no reason why they should have corns, and that, moreover, those who are afflicted with them will find them gradually disappear when the foot is clothed suitably to its natural functions. Seriously regarded, the position of the practical and scientific bootmaker has much analogy to that of the skilful physician. Whilst it is the business of the physician to restore health, it is not less the duty of the bootmaker to preserve the foot in its normal and healthy condition, and, therefore, his personal responsibility is, in a sense, equally great. It is a well-demonstrated fact that when the feet are punished by tight or ill-shaped boots the whole body is more or less affected, the powers of the mind being also disturbed. The child at school will make less progress, the youth at his business will be less apt, the tradesman less active; in fact, it matters little what pursuit of life a man may be engaged in, his usefulness will be materially impeded if suffering from the effect of improper foot-gear.

Then, again, it is an acknowledged fact that there is no health-giving exercise equal to that of walking, old-fashioned as it may now appear, when one-half of mankind is doing its best to balance itself on skeleton wheels and outstrip the wind.

But, whether for riding or walking, the bootmaker must understand that boots must be made in every way adapted to the feet, and that feet must no longer be tortured into the shape of ill-formed boots; and, further,

that the outlines and normal conditions of all feet are the same, as I shall endeavour to show by diagrams, dealing with such practical details as shaping the lasts, whether for hand-sewn or for models, so that all the natural functions of the foot may be preserved without at all detracting from its symmetrical elegance.

Whilst I am willing to admit that the practical and scientific bootmaker has his hands tied to a certain extent, as at present situated, by the caprice of fashion, I also hold it to be his duty, as well as his business, to educate his customers as to what is proper and suitable for them to wear. A discerning public will soon be able to appreciate his advice, and profit by it, and the tradesman who is ever ready to be led by his customers into the numerous and nonsensical whims suggested by them, will soon find himself without customers. Where fashion or folly compels a tradesman to deviate in any particular from the correct and proper method of shaping the boot, it should be done with judgment and care, thereby causing the least inconvenience to the wearer. This will come easy enough when what may be called the first principles of bootmaking, or rather lastmaking, are thoroughly understood. If the bootmaker is deficient in this particular, how is he to give proper instructions to his lastmaker? Indeed, he should, by rights, be his own lastmaker, as there is, in most cases, considerable difficulty in getting lasts or models made exactly as they may be required. Neither should we be surprised that such is the case, for if the lastmaker should by

chance have a correct idea of his trade, it will soon be knocked out of his head, as scarcely one of his customers would allow him to work it out. I know, from personal observation, that out of every hundred customers that a lastmaker has, at least one half will insist upon having something differing in style and form from the other half. This of itself is the strongest evidence that can be brought to bear upon the necessity for a thorough and practical method, such as may serve as a guide to the trade at large.

CHAPTER III.

MEASUREMENTS.

AS this portion of my subject relates entirely to the measurement of the foot, I must here refer the reader to the accompanying diagram (fig 2) of the foot and ankle. It will be seen that four lines are drawn across at various points. At these points the measure should be taken. For the sake of completeness I will add that the line from A to B represents the joint measure; C, D, the instep; E, F, the heel measurement; and G, H, that of the ankle.

Measurement is a work requiring the greatest possible care, and some experience; but too frequently it is left to those who know little or nothing of what is actually required. The measure should be taken close round each part of the foot, as marked on the diagram, and should be at once entered in an order book kept for the purpose, every particular of the order being stated therein, together with the peculiarities of the foot, should any exist, and with the requisite deduction required in fitting up the last, for nothing should be left to memory. Suppose a

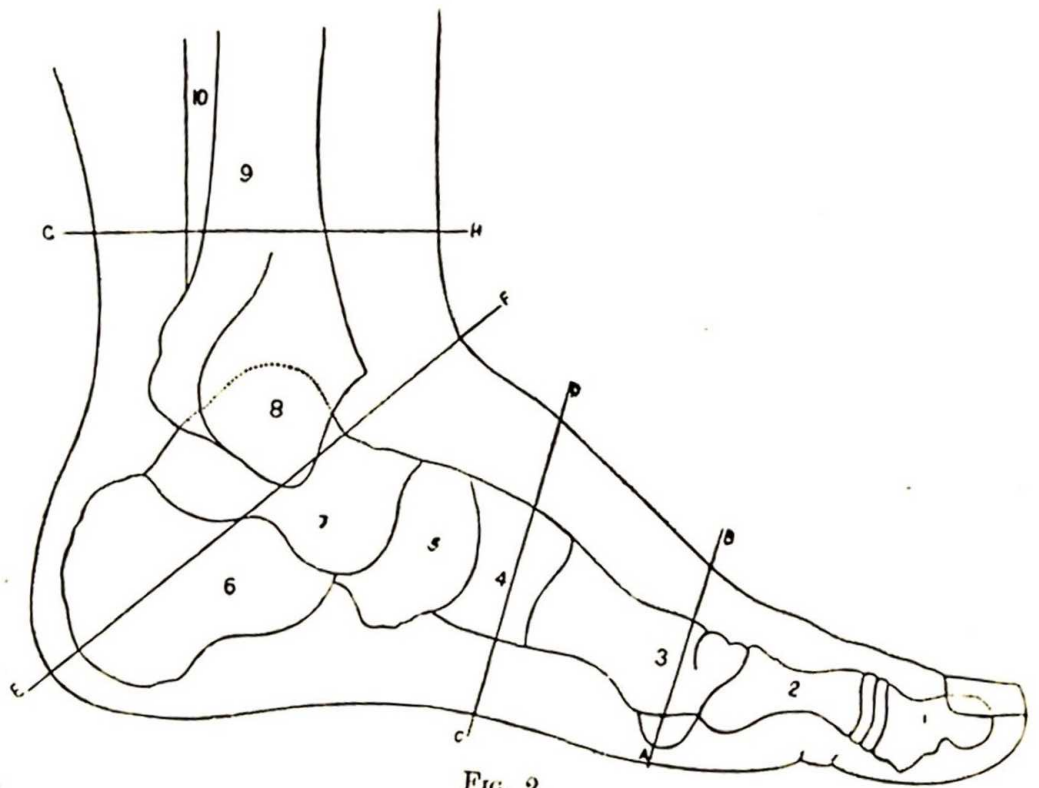

FIG. 2.

joint to measure 8¼ inches, in most cases the last would be fitted up to 8 inches only, in others it would need to be 8⅛, and in some cases of tender feet to make it full up, or a little over the measure. The person who takes the measure should certainly be able to understand all this, more especially as the order is generally handed over to a second or third person to be made up, who can have no other opportunity of knowing the customer's needs.

With regard to the measurement of infants, perhaps little need be said. Nevertheless, brief instructions for taking infants' measures may prove useful. First, the length should be taken, and the exact measure of the foot written down, then should follow the length the boot is to be made. If the last is sufficiently roomy to give freedom of action to the toes, 1½ sizes added to the actual length measurement will be all that is required. Next the joint should be measured, care being taken to bring the measure straight round the foot, as shown on the lines A and B on the diagram. The instep, heel, and ankle should be taken in the same way, and the measure entered ⅛th of an inch over the foot measure on each line. This allowance is necessary in all cases of infants' work. In children's sizes, from 7 to 10, two full sizes in length should be allowed; and, as a rule, ⅛th of an inch added to the other measures, the same as in infants. In the sizes from 11 to 1, 2½ sizes should be the average addition to the measures, together with the ⅛th extra allowance in all cases where the feet are growing, except

the order be for dress boots; then, of course, the measure would be set down a little closer. For youths' boots intended for general wear, three sizes must be added to the length, with $\frac{1}{8}$th over the measure added to the above cases. Sufficient freedom for the toes is particularly necessary in youths' boots.

Next follows the measurement of fully-developed feet. First, taking those of ladies' :—The measures should be taken in this case in the same way as in the others, and where the toes of the boots are to be of reasonable width and sufficiently roomy, an allowance in length of $2\frac{1}{2}$ sizes will be found a safe guide—that is, providing the boots are to have flat or ordinary heels, say up to $1\frac{1}{4}$ or $1\frac{1}{2}$ inches in height. And here let me call the reader's attention to an error that many bootmakers fall into with regard to extra high heels. I have so frequently heard it said, "You must give additional length on account of the extra height of the heel." This is altogether a mistake. When the under part of the foot is elevated by a heel ranging over $1\frac{1}{2}$ inch, the foot is taken entirely out of its normal condition, and its useful and healthy action destroyed. Instead of it having that springy elasticity so essential to an easy walk, the wearer is obliged to walk whole-footed, the foot being cramped up and confined at the bend of the joints, so that it cannot possibly get forward. It therefore follows that a shorter boot, rather than a longer one, should be provided, and, instead of $2\frac{1}{2}$ sizes being allowed, 2 sizes. or even $1\frac{1}{2}$ size only is required. Indeed, I have in my experience

of this class of work made up some hundreds of pairs with very high heels, allowing only 1 size in addition to the measure. These matters should all be thoroughly understood, and noted down with especial care when the measure is taken.

I have already stated that 2½ sizes are sufficient for a healthy foot, with moderate room at the toes, But where the foot is distorted, and the big toe turned out of its natural line, and, so to speak, mixed up with the smaller ones, it will be found, in most instances, that the foot will measure fully one size shorter than it would were the big toe in its proper position. It therefore follows that the boot should be made 3½ sizes longer than the measure, in order that other parts of the foot may rest in their proper positions. This kind of foot requires more than the ordinary amount of room at the joints—frequently being required full up to the measure —whereas, generally, the joints and instep may be booked at ¼ of an inch under the measure. Mistakes are frequently made in measuring the heel. The fact that the heel measures much less when the foot is held up for the measure to be taken than it does when it is planted upon the floor and is sustaining the weight of the body, is frequently overlooked. The measure is frequently drawn tightly round the heel from C to E, when it should be taken quite easy, and set down at most, only ⅛th of an inch under the measure. The ankle and leg should be cut to the full measure, though this may be contrary to the views of some foolish people, who

wishing to show a small ankle, destroy their health by checking the free circulation of the blood to the extremities.

For men's boots intended for general wear, three sizes, at least, must be allowed on the measure of the foot—that is, provided it is in a healthy and normal condition. But the same rule must be observed in cases where the foot is distorted, as above noticed in reference to women's feet, and, as a rule, the order should be booked for making up ¼th of an inch under the measure for joints and instep, and ⅛th for the heel, but full up to the measure in the leg.

In regard to the taking of measure for what is known as gentlemen's long work, such as Napoleons, jockey-boots, and thigh-boots, the same rule holds good, as to the joint, instep, and heel, as is applied in relation to short work, with the addition that the height and girth of leg must be taken in each case, the measure being taken from the back or off-side of the leg, and round the thick part of the calf. If for thigh boots, the measure should be taken from the centre of the kneecap and round the calf, the same as for jockeys, etc. A strict observance of these details will be found highly essential when I come to the consideration of the patterns.

Notwithstanding my every-day experience of the extraordinary lack of judgment and want of knowledge of the proper method of taking measures, I must confess that I was not prepared for a measure once received for a pair of jockey-boots, said to have been taken by a man

who had been some years in the trade. The measures given were the usual ones of the joint, instep, and heel, with the addition of three measures for the leg—namely, the ankle and calf, and a third midway between the two. This was all done with the greatest possible care, but there was no measure taken for the height of the boot. It was certainly suggestive of a new idea—namely, that of cutting a jockey-boot to fit close round the ankle. The only drawback in reducing the idea to practical utility would be in passing a heel (measuring 13½ inches) through an opening at the ankle measuring only 9 inches.

Whatever improvement may be ultimately made in the adaptation of boots and shoes to the natural requirements of the human foot, there will, doubtless, still remain a proportion of the public who will prefer to give orders and have their measures taken; others, who may be suffering from malformation or distorted feet, will, of necessity, require special attention paid to their foot-gear. These special orders finding their way indirectly, as they now so often do, into the hands of the wholesale manufacturers, it will be found desirable that the readiest and most efficient means for their execution should be provided. The greater part of these special orders will, of necessity, be made up machine-sewn. Nevertheless, a proportion of the very best work will have to be hand-sewn. The idea that this class of work is now experiencing a lingering death is, I know, taking much of the spirit out of many men, who at one time held a

leading position of the hand-made trade. The outlook may, indeed, appear cloudy; nevertheless, a little life and method may be imparted into these businesses with considerable advantage to the proprietors.

In getting up this class of work the first thing needful is the preparation of sets of lasts of the various widths required by the class of customers to be provided for. These should be so shaped as to be adopted to the forms and requirements of the foot in its normal state. The shapes and forms of these lasts I shall notice when I come to the consideration of models for machine-sewn work, as the same rule applies to both branches. Generally suitable fittings should also be provided. These should be numbered or lettered in regular order, and those of each particular substance ranged in sizes to suit the lasts upon which they are to be used—that is to say, one fitting for sizes 2 and 3, another for 4 and 5, another for 6 and 7, in ladies' work, and the men's and children's in like proportion. These fittings, being of three classes, should be marked thus: the joint piece should be stamped "A," the instep-piece "B," the long-fitting, or what is commonly called a "shover," "C." Where one of these is not sufficient, two or more can be used. If these little matters, simple in themselves but most important in their results, are attended to, they will materially assist the fitter-up, and cause great saving of time. They will also be the means of preserving the proper fitting for each particular customer, without keeping a pair of lasts fitted up for each one, as is now the case in many bespoke shops.

To illustrate my meaning further: after the measure is taken, the last most suitable to the customer should be selected, the measure applied, and fittings added as required; the particulars may then at once be entered into the book with the customer's order—say, "Mrs. A., a pair of plain goloshed balmorals, size 4, joint 8, instep $8\frac{1}{4}$, heel $11\frac{1}{8}$, ankle $7\frac{7}{8}$, lasts 4, No. 2 fitting, joint-piece A." Thus, in the case of future orders, a reference to the order-book will prevent the mistakes and misfits so common in the trade under the lax and unmethodical system general in vogue. I know I shall be met here with the remark that different feet require altogether differently shaped lasts. That the forms of feet differ materially I am ready to admit, but in most cases this is a sad misfortune to the owners, and a standing disgrace to the bootmakers, whose bungling ignorance has so distorted them.

My contention (one borne out both by science and observation) is that all human feet are modelled on one principle as regards the three, or what are called the tripod bearings; the only difference in the feet of people of various races being in length and bulk, these differences being attributable to certain circumstances of climate and locality. Therefore, taking these matters into consideration, the same general outlines in shaping suitable lasts should be observed under all conditions. I apply this rule also to distorted feet, however bad they may be, for experience has shown me that such a practice tends partially to restore them to their normal

condition, thereby giving comfort to the wearer of boots so constructed, by the device of aiding nature to somewhat recover itself from the results of man's cruelty and ignorance.

The two diagrams (figs. 2, 3) fully illustrate what I mean. They represent the feet of two persons, for both of whom I have made boots. The one is in its healthy and normal condition, and is what its Creator intended it to be. The other has been tortured out of all shape and form, and nearly all its elasticity and natural power destroyed. The dark spots on the toes are marks of some most terrible corns; these happily disappear, simply by the distorted feet being clothed with boots constructed exactly the same shape as those worn by the customer with the healthy feet. This gave not only ease to the owner, but a far better appearance to the feet themselves. A word will not be out of place here as to the cause of that foot being so deformed, more especially as the parents of the lady who owns the foot were especially anxious to provide her in her earlier years with boots which should be perfectly easy and preserve her feet. The directions given with every order were, "give plenty of room," "make them wide enough," and so on. The bootmaker, in his simplicity, obeyed his instructions to the letter. He made them wide enough—indeed, too wide, forgetting at the same time to give length in proportion to the extra width. Now, a wide boot lacking sufficient length proves more harmful to the foot than a close-fitting one would do, for this reason; when the

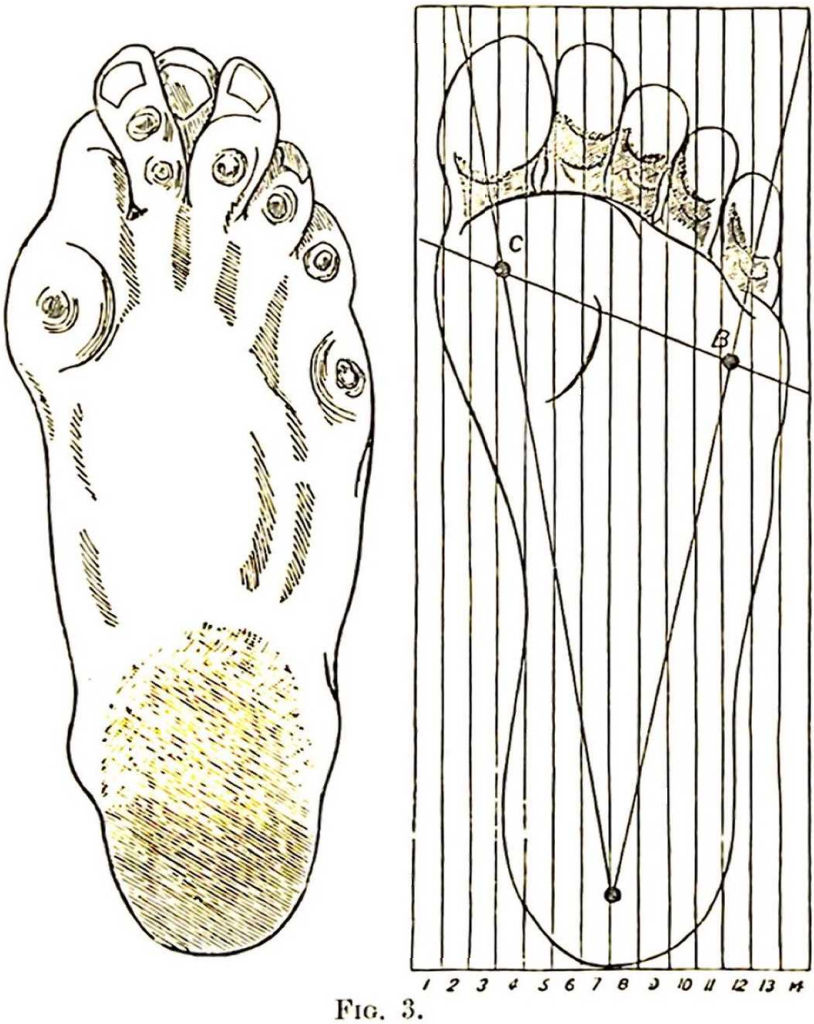

FIG. 3.

whole weight of the body is resting upon the foot, the big toe shoots forward and is driven with force up to the end of the boot; being here checked in its forward progress, it naturally turns aside and inclines towards the other toes. The consequence of this action is that, as the toe gradually shifts out of its natural position, the upper joint—formed by the bones numbered 2 and 3 on the diagram (fig 1)—gradually opens. Nature abhors a vacuum, and at once commences to fill up the aperture thus made in the joints with an oily, or rather a fatty, matter, which ultimately resolves itself into a kind of gristle, forcing out the nerve-tissue, and forming those painful excrescences called bunions. The natural freedom of the other toes being thus interfered with, they get crushed one upon the other, and thus corns, with all their painful consequences, are cultivated. Therefore, I repeat, whatever we can do in the shaping of boots and shoes, with a tendency to entice the foot—if I may use the expression—back to its natural condition, is sure to give ease in a greater or less degree. I fancy I hear some of my readers asking how I would provide for these bunions if I did not put large pieces of leather upon the lasts to form a sort of bed or cradle for them to rest in. I do nothing of the sort, as this kind of remedy simply increases the disease. I shall endeavour to show this more clearly in further references to the diagrams given herewith.

The method generally employed to provide ease for the bunions upon distorted feet is to put a thick piece of

leather upon the inside joint of the last, making a kind of cradle for the excrescence to rest in. Instead of this kind of treatment proving anything like a remedy, it simply perpetuates and increases the disease. These receptacles, moreover, are often placed where they are not exactly intended to be, at one time being too forward, at another too far down toward the arch of the foot. In either of these cases they must, of necessity, be entirely useless, as well as detrimental, on account of their giving a most unsightly appearance to the general outline of the boot.

As this part of my subject is one of the most important that can engage the attention of the bootmaker, I am all the more anxious to make myself thoroughly understood. Reference to the diagram (fig. 3) of the foot shown will materially aid the reader to follow me. On the diagram it will be seen that a circle is described on the joint of the big toe, at the letter C. This circle is supposed to denote the extent of a bunion gradually forming, which would, under ordinary circumstances, be increased by the least irritation. By making what may be called a bed to give it temporary ease, the foot, when in the act of walking and sustaining the weight of the body (which is borne entirely by the big toe of one foot as the other is being thrown forward) thereby presses the enlarged joint with greater force into the space provided for it. The consequence is that an improper pressure is put upon the foot at the point shown by the letter A, and, as the boot is supposed to fit that part of the foot, forcing the

big toe still further out of its natural and straight line. Just in proportion as this is done, so is the bunion increased, with all its painful consequences. Practical experience for a period of upwards of a quarter of a century has fully convinced me, not only of the error of the foregoing method of fitting up lasts for feet subject to bunions, but of its painful results. It has, moreover, fully convinced me that a method in direct opposition to it, upon which I have been working during that period, is based upon a natural and, therefore, correct principle. Instead of aggravating the disease in the way I have shown, it tends to improve the foot and restore it partially, if not wholly, to its normal position. There is also this further additional advantage, that the boots so made can be worn without the least pain or discomfort.

My method of fitting-up and shaping a last is—that is to say, when fashion or folly does not impede my choice, in the first place—to shape the sole-part exactly suitable to the requirements of a healthy foot. Almost a straight line is kept from the joint to the toe-ends, and at the same time care is taken to leave sufficient substance of wood to provide the required ease; but the last is thinned down gradually towards the end, in the same manner as if no bunion existed. On the outside of the last plenty of room is left to give the necessary freedom of action to the small toes. It must not be forgotten to state that these small toes have an important, and, under some conditions, a very difficult part to perform. In the act of

walking they grip the surface, or inner sole, of the boot with considerable force, as the weight of the body is borne by one foot, whilst the other is being brought up from behind and placed forward in order to sustain the body. In this mechanical movement the direction of gravity is between the two feet. When we consider the additional strain put upon the muscles of these small members of the body under the more trying circumstances of moving up or down upon an inclined plane—running, jumping, fencing, or in long walks—it will at once be seen how essential it is to provide full freedom of action for them. Where these provisions are made in the fitting up of lasts, not only is pain and inconvenience avoided, and the natural functions of the foot preserved, but the boots, when worn, retain their shape altogether from first to last, and give to the foot a smarter and more genteel appearance.

The full freedom of the front part of the foot being thus secured, the lasts may be drawn in from the joints to the heel, so as to clip snugly (but not too tightly) round the back part of the foot.

It is quite a mistake to make the seat of the last too wide. Where this is the case, the shifting of the heel from one side of the boot to the other, when the foot is placed upon an uneven surface, is sure to cause the boot to go over on one side. Indeed, the foot should feel a properly adjusted boot or shoe clinging to it round the waist and heel. In fitting up and shaping the last, whilst every possible care should be observed in pro-

viding for the natural bearings and general outlines, it must not be forgotten that there are at least two other important matters that must not be lost sight of—viz., lightness in hand and smartness to the eye. Therefore, a thick, clumsy-looking waist is to be avoided, as being both useless and unsightly. Let the fore-part of the sole be brought no further below the front bearing (as marked in the diagram) than is actually necessary. The outer sole pattern given will be a fairly safe guide in these matters. It will give an idea of what width the heel of the last should be to carry the width of the back part of the sole, as well as the proportion of width for the fore-part. There must also be a suitable arch to the waist of the last to give a graceful appearance to the boot and comfort to the foot, but this must not be overdone. The matter of the waist arch is one requiring observation and judgment.

I may here say that I regard this as a test-point of the skill of the bootmaker, not only in fitting-up tho lasts, but also in cutting the pattern. I shall have to consider this matter more fully when I come to the question of pattern-cutting; but, in passing, I may here call the reader's attention to a statement of fact which I made in an earlier chapter of this series—namely, that, in proportion as a people advances in civilisation and culture, so also does the foot give forth evident signs of a finer symmetrical development. Therefore, while I contend that the general bearings and natural functions of the foot in all races of men require similar provision, I must not be

understood to mean that all have the same proportions, for in this particular there is almost as much difference in feet as in features. Not only is this difference observable in various races of mankind, but a difference is also observable in various localities or countries inhabited by the same peoples.

Those residing in the more flat and open regions have feet of finer mould than their brethren dwelling in more mountainous parts. These latter are provided with feet more suitable to their locality—the surface or sole almost flat, with long heel and long toes, to bear the hillman up, or, as he climbs the mountain side, grip the ground as he descends the steep incline. The finely-arched foot of the European, with its symmetrical proportions and moderate length, is a most striking contrast to the foot of the negro or other savage. But even European feet differ, not only in countries and localities, but also in families; whilst there are numberless intermediate degrees to be found between the two extremes of civilisation and barbarism.

The bootmaker—that is, the practical man—will observe these differences as they, from time to time, come under his observation in taking measures. At the same time that he is making ample provision for the preservation of the feet of his customers in their normal state, or restoring them if they have been previously distorted, he may caution them against the very common folly of wearing socks or stockings that are too short for the feet. And here I may be allowed to qualify, to some extent, the cen-

sure I have levelled at the trade for the discomfort and torture caused by bungling and ignorance of the fundamental principles of the craft. Its members have quite enough to answer for on this head, without being charged with the evils arising from the follies of their customers, who, I must in justice admit, cause a large percentage of this foot distortion, bunions, &c., by wearing stockings much too short. These act upon the toes just in the same way as has previously been described in the short boot.

The notion of fitting-up and shaping the sole of the last so that it should have a prominence on the sole immediately under the great toe, prevails very generally throughout the trade. I am ready to confess that additional comfort is thereby given to the wearer, as well as greater security that the boot will retain more of its original shape. But, after all, this is but a partial remedy for the evil in which I, in common with many others, complaint. It is merely a patch upon the sore ; a lopping-off the branches while the canker worm is eating away the root. Here, if I might be allowed to borrow an exclamation from "Hamlet," I would say, "O! reform it altogether." And, by the way, let me preface what I have to say upon this point by reiterating that my method is no mere theory, but a fully-established practical system, based upon natural physiological law, and is so recognised by capable judges who have had opportunities of observing its working. Whilst I endeavour to dispel what I consider the erroneous ideas

of others, I am ready to admit that we have all yet much to learn; and if, by comparison of ideas, a well-developed, comprehensive, and complete scientific method should be involved, commending itself to the great body of the boot and shoe trade, the advantages accruing to the trade itself would be considerable, and, at the same time, an inestimable boon would be conferred upon the general public. As regards the prominence to be left on the sole of the last, making a cavity for the ball of the big toe to rest in, I treat that in the same way as I did the prominence so generally provided for bunions.

If the conditions I have previously laid down in regard to the shape of the sole of the last, etc., be strictly adhered to, this especial provision for the ball of the foot is not only practically useless, but physically detrimental to the wearer. If, for instance, cavities are to be of any advantage, they must be so carefully arranged that the centre of the cavity shall in every instance catch the concentrated force of the muscles of that prominent joint under all conditions of bodily activity. Anyone, however limited his experience may be, will, with a moment's reflection, see that there is a difficulty in this respect. I do not let the matter rest upon a qualified negative, but unhesitatingly declare it to be an utter impossibility to make provision in this way, even if it were useful, and for a very simple reason. A knowledge of physiology will tell us, should ordinary observation fail to do so, that there is scarcely a human

foot that retains the same exact dimensions for twenty-four hours together; at one part of the day the foot will be larger than it is at another part of the same day. When in this enlarged state the foot cannot advance sufficiently forward in the boot for the centre bearing to rest in the centre of the cavity provided for it; it has thus to work on the edge of this cavity, a kind of inclined plane, causing a friction that must be a source of discomfort to the wearer, at the same time that it robs that particular joint of a considerable part of its muscular power. Again, when the foot is at its smallest dimensions, it will, of course, work in a similar way on the opposite, or front, part of the ridge in like manner. Further, when the ball of the foot does accidentally fall exactly into the pit so carefully provided for it, I even then contend that its muscular power is considerably less than it is when the foot is planted upon a more even surface. A reference to the previous anatomical diagrams will materially aid the reader in coming to a conclusion upon this point. At the same time, I do not mean to say the fore-part of the last should be one dead level.

Ample provision must of necessity be made for the bearings on the ball of the foot. My views upon this head will be fully illustrated in future diagrams.

Exception has been taken to my views as to the treatment of children with weak ankles. I have stated that I had had in my experience an opportunity of testing the results of two directly opposite systems or methods of treatment, both of which are recommended by men of

eminence in the medical profession. The one prescribed high stiffenings, whalebone, steel springs, and tight bandages. The other set his face against everything of the kind, allowed no external pressure upon the ankle, but ordered shoes, and even those of the most elastic and pliable kind. The patient in the latter case made perceptible and rapid progress, as Nature was allowed to do her own work in her own particular way; whilst the other patient's progress was slow and uncertain, and what progress was made seemed to me to arise more in spite of these external pressures than by their aid. A correspondent, who favoured me with the result of his experience with one of his children who was afflicted with weak ankles, stated, I think, that he had tried for two years boots of the lightest texture, and the most supple description, and had, besides, used salt baths, etc. In fact, he had given Dame Nature every conceivable chance to do her own work, but in no single instance had she responded. The child continued to get worse, and ultimately was unable to stand. He then made her high boots with steel springs in the legs; and when these were put on and laced highly, the child was able to walk across the room. His letter concluded by asking what I would say to this experience. My reply is that I think it is very likely to have been the case. At the same time, I think it was something more than a weakness of the ankle. The joint might have given way, and in that case his treatment of the case was perfectly correct. I think Dame Nature, although one of the best physicians, does not

profess to cure malformations, to put dislodged ankle-bones into their proper places, or even to set broken limbs, I think, moreover, it was a misnomer, when the child's legs were braced up in steel, to call its progression walking; its should rather be termed stumping out.

CHAPTER IV.

THE PREPARATION OF LASTS IN SETS.

A STORY is told of an old Quaker farmer, who, on being asked by a traveller the distance to Taunton, naively replied, "Ay, that depends on the way thou'rt going. By the way thou'rt going now it is about twenty-four thousand mile; but if thee turns back, thee'll get there in half an hour." I know of no more apt illustration of the manner in which the majority of businesses in the boot and shoe trade are started, worked, and provided with plant, than the above. There seems to be a disposition pervading this branch of British industry to work on wrong lines, and to go a very round-about way to attain the desired end; and there are, I fear, but few engaged in it who have the moral courage to turn back, even when warned of their errors. It is a very common practice with men starting in this business—not only with those whose capital is limited, for men of larger means are equally at fault—to get a single set of iron lasts, or models, of what they call No. 3, or medium,

fitting, hoping they may suit whatever goods they intend to produce. They will work on with these for a time, until they find their customers require other fittings besides No. 3. Then another set of lasts, or models, is provided; the second set differing entirely in all essential properties from the first. In this manner the plant is from time to time what is called filled up, while at the same time different styles of patterns are required for each set of lasts.

A little sound advice, or even reflection, at the commencement would prevent anyone from making this serious mistake; the nature of which will be sufficiently obvious when we consider how these varieties of form and capacity harass and perplex the retailer in serving his customers. In providing a plant, a man should know exactly what he wants, or if he does not know himself he should find someone who can teach him, and provide accordingly. It is especially necessary that each set of lasts and patterns should be in perfect harmony with every other set. Were this always the case, and all the necessary widths provided for upon a basis adapted in every particular to the requirements of the foot, there would be very little need for bespoke work, which is gradually becoming a troublesome as well as an unprofitable part of the shoe trade.

There is no fixed standard of measurement for the different fittings. Nevertheless, there seems no reason why a national system should not be established and recognised by the trade as well as the standard for

lengths; though even this is not altogether in a satisfactory state at present. These matters, seemingly trivial in themselves, are of very great importance to the trade at present. Individually. no attempt to formulate new rules could avail, but, with may other needful reforms in the art of boot-making will form interesting subjects for inquiry and development in the trades technical schools when established. In the meantime, much may be done by the application of a little common sense to the work as we now have it to do.

I would now ask the reader to consider what I have already written in reference to hand-sewn work as strictly applicable to the machine-sewn department. Especially is it so as to giving the formal outlines of the sole to catch the various bearings of the foot under all circumstances. Whether the foot be narrow or wide, the same form of sole of the last should be most strictly adhered to.

In respect to infants' lasts, two different fittings are generally found sufficient. A straight shape, with wide sole and broad toes will, in this case, answer; but in larger sizes, no straight lasts should ever be used. The infant's foot, when its possessor gets fairly on its legs and can take plenty of outdoor exercise, loses the fleshy plumpness which it previously has shown, and begins to assume its normal shape. At this time a straight shape interferes with its natural development; therefore the bootmaker who is wise will not recommend it.

For girls' or boys' work, from 7's to 10's, at least three fittings are required, with a good free width of sole. From 11's to 1's, and from 2's to 4's in youths', it is desirable, where a general trade is done, to have four fittings; but for men's and women's work, at least five different widths of fittings are necessary—indeed, as many as six are used in some manufactories.

Models for the various fittings can only properly be prepared by those who have practical knowledge and experience as to the natural development of the different grades of feet for which these models are provided. Although, as I have already stated, the general outlines and bearings of the sole of the foot are, in all cases, very similar, the graduation, or proportions of the measurement of the different parts of the foot, bear no comparison one with the other.

For instance, the foot that should be termed No. 1 measurement is very thin and bony, the instep showing but a very slight elevation. Its substance falls away very much below the ankle, and the heel is rather long and sharp.

The joint of this foot will be found to measure nearly as much as the instep. There is rarely above three-eighths difference in measurement between the two. This is a most important matter, and one not generally understood.

The divergence of proportion between the No. 1 and the No. 2 fitting is most striking; the difference being considerably more than between any of the other fittings,

the latter being the smartest, most symmetrical, and elegant of the whole range of human feet, whether of men or women, and as a popular belief has it, an evidence of gentle birth. A foot of this class shows a finely-arched instep, small joints, short heel, and thin ankle; the rise from the joint to the instep is usually three-quarters of an inch and upwards. In preparing the models, a rise of three-quarters of an inch for the instep should, in all cases, be allowed for ladies' work, and seven-eighths for men's.

In the case of No. 3 fitting, the foot is altogether of a different build, being much thicker at the point, and having fleshy, full-developed muscles—giving evidence of strength, though what it gains in strength it loses in symmetrical outline. The rise in the instep of the foot is seldom more than half-an-inch for women's and five-eighths for men's.

The No. 4 fitting is similar in its proportions to the No. 3, with, of course, the extra allowance in width. The No. 5 possesses very much the same proportions, and must be provided for in a similar way.

Here I must call the reader's attention to another most important matter, that must not be overlooked in preparing the models—that is, what are called flat feet. These are generally thin and bony, with a prominent bone protruding on the outer part of the foot, between the joint and the heel.

A boot made on a last of ordinary shape, with moderate arch, will not "sit" on this foot, as the flatness

FIG. 4.

of the foot, presses upon the waist of the boot, forcing it out of shape, thus causing the upper to fall into folds along the foot, just below the ankle. These flat feet require not only different lasts, but different patterns to fit them properly. A word here as to the cause of this flat-footedness will be strictly in place. In most cases it has been caused by ill-constructed boots, by which undue pressure has been placed upon the top of the insteps of the feet of young persons, thus forcing down the three bones marked 4, 5, and 7 in the diagram of the foot previously given. The key of the instep arch is thus borne down, destroying at once its elasticity and power of usefulness. Anyone afflicted in this way very soon becomes fatigued, and cannot take that amount of exercise necessary either for health or business. I have found it a very successful practice to use shoe lasts in making boots for this class of feet, and can, therefore, recommend them with confidence.

The rough drafts of the two lasts shown in the diagram (fig. 4) are given to show the amount of spring required in each. These are adapted to the foot in the act of walking for a boot with an ordinary heel of 1¼ inches. It will be observed that the points of the toe and heel rest upon a horizontal line, whilst the ball of the last rests upon a line five-eighths of an inch below the first one.

This amount of curve is all-sufficient for the ball of the foot to rest in, and will give it perfect freedom of action, provided always that there is room in the upper. It will

also be seen that the same rule is set forth as regards the shoe as for the boot. The only difference in this respect is in the waist being not so much arched as for that of the boot. A ball rising five-eighths will carry double that height of heel, namely, 1¼ in., and at the same time allow ample scope for the foot to rise freely in the act of walking.

CHAPTER V.

SOLE AND INSOLE PATTERNS.

THE models and lasts being provided, the next matter to be considered is the preparation of the sole-cutter or knives, or rather the patterns from which they are to be made. This should be the work of a thoroughly experienced man, as, if the patterns are cut in a careless or in a slovenly way, all the previous arrangements will be, to an extent, neutralised. The proper method of preparing is to have inner soles rounded exactly to suit, in every particular, say No. 2 fitting lasts. The outer sole patterns should be rounded from these, leaving a sufficient margin to clear the feather of the boot when finished, carrying a moderate or medium substance of upper. Especial care is here necessary, as the feather is one of the principal points in a boot or shoe of any kind. I recollect several instances of hand-made prize boots, exhibited in the West-end of London, which had been most artistically and beautifully made in all other respects, being altogether condemned on account of the feathers by the old "dons" of the trade, who studied

and well understood all these points in the construction of a boot or shoe. Although these exhibitions of prize work and frequent trials of skill led to a great deal of irregularity in the lives of the men and their associates, nevertheless we can look back to these times with some degree of pride, mingled with regret that so much talent as was then shown in the craft should have been suddenly eclipsed and almost stamped out by the inroad of those twin abominations, rivets and tingles, which, in time, will, no doubt, give way to some less objectionable substitute.

The feather is one of the principal features in stamping the character of the boot and the skill of the workman. But where the inner sole knife is specially adapted to the shape of the last, little is left to the laster but to tack the inner sole on to the last in its proper place, and skive the edge down to an even substance. Where the skiving is neglected it not only gives the outline of the boot or shoe an uneven and unsightly appearance, but it is a positive inducement for the boot to get out of shape.

The margin on the sole over the inner sole, from joint to joint, in a lady's boot may be set down at one-eighth of an inch, and one-sixteenth for the waist, but a size over the inner sole in the length of the heel will be necessary. It will be observed that I have set down No. 2 fitting as the set of lasts to guage all the other knives from. The reason is that the sole for No. 1 fitting is required as wide as the sole for No. 2 fitting. The joint of the former being more bony causes it to require an equal width of sole

to the latter, and therefore it would be a useless outlay to provide additional knives, as the bottom outlines of the lasts would be similar in each case.

The knife patterns for No. 3 fitting must be cut by the same rule as No. 2, with all the additional width required, care being taken at the same time to keep exactly to the same shape in every way, and so on with Nos. 4 and 5 fittings, giving in each case only extra widths without departing in any way from the style of the previous fittings. This uniformity will be of considerable advantage to the manufacturer, by showing at once that care and mechanical skill are both made use of in his establishment, and will at the same time impart a degree of confidence to his customers in giving orders for the different fittings required. The disorder in this respect, that runs almost—or with very few exceptions—throughout the trade, causes constant dissatisfaction. Frequently have I heard the retailer ask the manufacturer, "How is it that you cannot supply me with the same shape and style of boot in No. 2 or No. 4 fittings as you do in No. 3 fitting?" The inference to be drawn from a question of this kind is, that the manufacturer either lacks the means or the ability to provide the necessary plant; the latter being by far the less pardonable evil. Whilst this state of things is discreditable and a serious loss to the manufacturer, it is, at the same time, a great inconvenience to the retailer, who has not infrequently, after ordering his medium or No. 3 fitting goods, to go to a different maker for his No. 2 or smarter fittings, and to another for the

wider Nos. 4 or 5 fittings, as the case may be. I have dwelt especially upon this point, in order to induce a thorough reform in the bungling practice that so largely obtains.

There is another advantage to the manufacturer in the systematic rule of providing soles. It is well known that for some classes of work, especially for winter or heavy wear, a greater width of sole is required than for the more general run of goods. Then the No. 3 sole can be used for the No. 1 and 2 without any inconvenience, it being proportionate in all its parts; and the No. 4 sole can, in the same way, be used for No. 3, and so on. In fact, the advantage are, in this case, as in almost all other cases, on one side, that being the right one.

The same rule should be observed in preparing sole patterns for men's work as has already been laid down for ladies' work—namely, in making the sole of No. 2 fitting answer also for No. 1. But as the uppers of men's work run stouter as a rule, than those for ladies', it is obvious that a greater margin should be allowed over the edge of the inner sole after it has been properly rounded to the last. I have stated that the eighth of an inch is sufficient for ladies' work; at least, three-sixteenths of an inch round the forepart from below the joints is required for men's ordinary work. From this point, through the waist towards the breast of the heel, half that width will be quite sufficient, but before reaching the corners of the heel the sole should be gradually drawn out or widened to at least three-sixteenths, or even

a quarter of an inch, in order to clear the corners of the stiffenings, which ought always to reach down into the waist of the boot. This, I should remark by the way, is a mistake very common in English work. The stiffenings are invariably cut too short, and too high at the back. They are therefore actually spoiled in both ways, without any corresponding advantage being obtained. If the wasted material at the back were added to the length of the stiffenings, it would cause the boot to be of considerably more service to the wearer, both as regards comfort and durability, and at the same time would add materially to its general appearance. This oversight is only another instance of the careless way in which business in the shoe trade has been pretty generally conducted. And here let me say, by the bye, that this particular error is confined almost entirely to boots of British manufacture. The French, Germans, and Austrians show more wisdom in this respect than we have hitherto done. Take up a boot or shoe manufactured by any of these peoples, no matter how common the article may be, and it will invariably be found to contain a good and suitable stiffening, not high enough at the back to appear unsightly, but sufficiently to catch the heel cup-like as the foot is placed inside the shoe. The stiffening is also brought well down into the waist of the boot. This being a point of vital importance to the manufacturer, the retailer, and to the consumer, it should have special attention when patterns are provided for the stiffening knives. Returning to the question of rounding the sole,

I may remark that, from the breast of the heel, it should, in the case of men's work, be gradually drawn out to a full size at the back of the heel. The entire length of the outer sole for men's work should be 1½ sizes over and above the length of the inner sole ; whilst, for women's work 1¼ size additional length of sole over the inner sole will be sufficient. Four widths of sole will at least be required ; and more, if stout shooting boots, with wide welts, are to be made. It will at once be seen how essential it is that all these soles should be guaged in perfect harmony one with the other, so that the wider soles can be used, without inconvenience, for the narrower fittings. The same rule applies equally in proportion to children's and youths' boots and shoes.

CHAPTER VI.

THE GENERAL PRINCIPLES OF UPPER PATTERNS.

SOME seven or eight years since, a boot manufacturer of standing in the trade, asked if I could recommend him a foreman "who had no ideas of pattern cutting." With all my previous experience in the trade, I must confess that this certainly seemed to me a quite original and novel idea. The reasons he gave for requiring this negative qualification on the part of the foreman showed some degree of philosophy, and a good deal of shrewdness; "for," said he, "I have made three changes of foremen within the same number of years, and each one set to work immediately on his arrival to condemn and demolish, without exception, the whole of the patterns of his predecessor, and, as a matter of course, set to work to get out sets of all kinds, in a style that would make a mark in the history of my trade. The sequel has invariably proved the truth of this last remark, for I firmly believe that if I should have the misfortune to engage another of the same stamp, my trade would be driven away altogether. My present foreman has been with me

now upwards of nine months, the whole of which time has been spent in cutting paper patterns, converting them into zinc, and then altering them so as to enable the men to make up the tops cut from them. Although I am far from being satisfied with the patterns I have at present, nevertheless I can, with some little difficulty, manage with them, they have cost me some hundreds of pounds, and I will now keep what I have got, especially as I intend to relinquish business altogether in the course of three or four years. This," he added, "is my experience of pattern-cutters: although there are, as I well know, many in the trade who are well up, and really clever and artistic, in this branch, nevertheless, I fear that there are many other employers who have had to undergo a similar course of unprofitable experience."

The variety of ideas that are continually being put forth in boot and shoe patterns, more especially in regard to ladies' work, is truly bewildering, and makes one almost wonder what kind of creatures there are inhabiting the globe who require boots made from them. As for as my limited acquaintance with the races of mankind—and womankind—goes, they are unsuited for any now upon the face of the earth.

A friend of mine remarked the other day, "Is it not strange that, of all the different styles of pattern from which boots are cut, they all seem to do?" I replied, "It would be far more germane to the matter if you said they all seem to *go*. As to the doing, they certainly do not." To the more educated men in the trade, it seems

a matter of no small surprise that a market can anywhere be found for some of the unsightly and peculiar-shaped articles that frequently come under their observation. One of the principal manufacturers in the East-end of London showed me, some few years ago, a set of patterns, both artistic in design and very neatly cut. From these 500 pairs of tops had been cut, every pair of which, if not entirely spoiled, required to be cut to pieces and considerably altered before they could even be lasted. This manufacturer was no novice in the trade. He was, and is, doing a first-class business, and has also had a considerable amount of practical experience. Nevertheless, he allowed such patterns to pass—nay, even boasted of them—without detecting their faults.

Those of my readers who have duly noticed the diagrams of the human foot, issued in connection with this series, and who have followed what has been written in explanation of its form and functions, can never fall into such errors as those above mentioned. Indeed, if a man will look at his own foot when standing in a upright position, or when going up or descending an inclined plane, or going up or down a staircase, he will at once discover the style and pitch of the pattern required to give full freedom of action to the foot, in the position it has to take in order to sustain the body under these and many other conditions. A great physician once said in the course of a scientific address to his students, "When man is at a loss he should open the book of Nature and study there; take Nature for your guide and she will lead you right." The

same advice I give, in full confidence, to all my young readers who have the ambition to rise and take a position in the trade. Instead of following Nature, who would lead us by the light of science to wise and proper conclusions, we have ignored Nature and her laws altogether, and consequently are left to grope our way unaided in the darkness of ignorance. There is a great amount of scientific as well as of practical skill required in the proper construction of a boot; and, as pattern-cutting is one of the principal branches of the business, it naturally follows that a matter of so much importance will require the most serious attention and study of all who would master it. If the reader will now refer to a previous chapter of this series, and notice what I have said in reference to the difference between the foot described as requiring the No. 1 fitting, and that requiring No. 2, it will materially aid him in following me in my reference to the patterns required for the same kinds of feet. It will invariably be found that the man or woman who owns what we may call a No. 1 foot stands in a somewhat different position to the one who has the No. 2; the latter, who has the smart, symmetrical foot, stands well upright, with instep well arched, and requires a pattern cut inclining to hang somewhat at the back, rather than otherwise. On the other hand, the thin, bony foot, with full joints in proportion, a more prominent bone on the outside waist, and a less arched instep, has a leg which inclines rather forward, possessing less muscular power and slightly bent forward at the knee joint; consequently, the pattern for this foot

should be cut to a different range from the other, with a more forward incline. In the case of flat feet, however, an exception must be made to this. The object in pattern-cutting is to cut patterns to the pitch that will give them an upright position when made, and this can only be done by adapting them to the kind of heel they are intended for. Reference to the accompanying diagram (fig. 5) will show what is required for a flat, or top-pieced heel, and also what is required for an extra high heel, or on intermediate height of heel between these two extremes. The difference in the length of vamps of the two patterns should also be observed. The vamp for the flat heel boot pattern is $3\frac{5}{8}$ inches in height in the above-mentioned diagram; this is at least required in what may be called a rationally-cut boot; the curve at the top of the vamp in front is just one-third of the width across the whole of the vamp at that point, that is, if the front of the vamp at this line measures 6 inches, the curve should not be more than 2 inches, and 2 inches for each wing. This, if the margin is allowed on the vamp and quarter for turning in and laying over, will just clear the joint of the foot, or big toe joint, a point that must never be overlooked where an easy boot is required. But a vamp of this kind is quite unsuited to a boot with a high heel, where fashion and folly step in to injure the foot by elevating the heel to an unnatural position, and, at the same time, to compel the use of a short vamp to still further injure the toes, by the folds of the vamp and quarter, with the stiffness of the seam, being brought with irritating force upon the most

tender and sensitive part—the joint of the big toe. The instep being so suddenly raised from this joint by the high heel, a high vamp would sit in folds across the front, and have a most unsightly appearance.

As the sapling bends to every passing breeze, so do the tender limbs of the infant yield to the least pressure that is put upon them. The healthy and full development of the form and faculties of infants is a matter of deep concern to all parents who have due regard for their offspring; and, as has been abundantly shown in the course of these papers, it is a matter of great importance that the feet of infants should receive every care and attention, in order that they may preserve full freedom of action, and have the muscular power and symmetrical form that can alone fit them for the important duties they are intended to perform.

It is said that "The child is father to the man;" but, as infants, up to the present day, have given no evidence of their ability to choose the boots and shoes that are best suited to their tender condition, and as their parents as a rule, show an almost equal deficiency in this respect, it follows that the responsibility of the matter falls upon the bootmaker. I have already shown what is necessary in moulding the last and shaping the sole for infants' boots and shoes. The diagram given herewith will at once show what I consider a proper standard of patterns for infants' medium fitting boots, ranging from 4 to 6 sizes. They are upright in position, allow freedom of action to the foot and ankle, and show but a

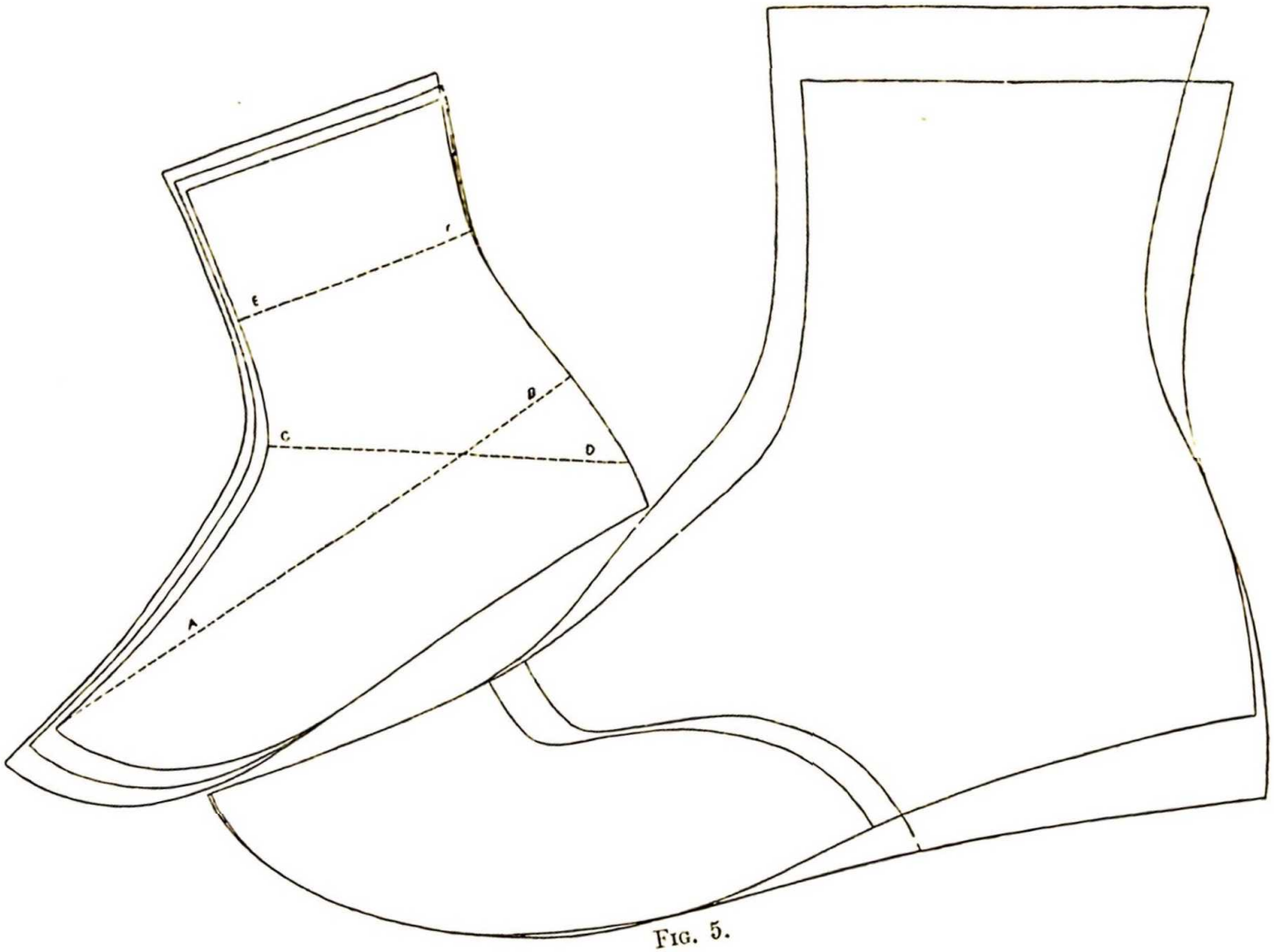

Fig. 5.

trifling difference in measurement between the sizes, more especially in the legs. In ranging a set of infants' boot patterns, one-thirty-second part of an inch will be ample for the additional width to be allowed on the patterns, at the ankle, E F.

In order to ensure a perfect upright position to the standard pattern, the bottom of the pattern should rest upon a horizontal line, the back of the heel and the ankle measure just catching the perpendicular line at the back, with the toe resting upon the second line, A, B, running from the heel: this line is drawn especially as a guide in ranging the patterns into sets, and the series, beginning, if necessary, at 0's up to size 6 must all rest the point of the toe upon this line. Where this precaution is neglected, the set of patterns will not be correct. It is only needful to have the same amount of draught or spring in the small sizes as in the large ones, in any particular set of patterns. They should be all gauged upon the same geometrical lines. I know it is very common, and, at the same time, a very easy practice, to get out the small size of any set required, and then to describe a line with the compasses at a distance of an eighth of an inch from the toe to the top of the leg, leaving a size on at the toe for the additional length, and so on, until the set is complete. This is only done by those who know no better way of cutting; but a moment's reflection will at once show how very erroneous a system of this kind must be, both in principle and practice. A set of patterns ranged in this incorrect manner will show that the length

of the instep in a No. 7's size is exactly the same as the No. 1 size, but six times the length in the forepart, or from the instep to the point of the toe. Then, again, one finds the point of the toe of size No. 7 raised to a line five-eighths of an inch above the line of the smaller size, or to a right angle of 90 degrees. At the same time, the length of the top of the pattern is reduced from the throat to the toe, and so much additional length given to the bottom of the pattern. It is, therefore, clearly evident that, if one pattern of any set cut in this way be right, all of the others must of necessity be wrong; seeing that they are all drawn to different angles. If, then, they are so thoroughly wrong in theory, what must they be in practice, when the uppers cut from them get into the hands of the laster, who is expected to perform an impossible task in getting them lasted so as to sit clear without wrinkles when off the last. Many a good workman has been discharged through errors of this kind—not his own, but those of the pattern-cutter; who, not infrequently, has to take in the work when made. I shall now proceed to give illustrative diagrams, and explain simply how to guage sets of patterns upon one simple principle, at the same time showing how shoe patterns may be copied from the boot patterns, singly or in sets.

With regard to shoes, I may say that, in most cases, I recommend them in preference to boots, as giving much greater freedom of action to the foot, and being in every way better suited to its natural requirements—that is to

say, in ordinary and fair weather; but for rough weather, and for some occupations, boots, of course, are specially needed, and will continue to be worn. What I am particularly anxious to do in the course of these papers is to convince retailers and boot manufacturers to adopt a course of action, certainly not generally adopted—that is, to recommend to their customers the classes of goods that are best suited to their various wants and callings. Would space permit, I might give many excellent reasons for this course; under some other and more suitable heading I may shortly do so. It appears to me that we are about to commence a new page in the histo y of the boot and shoe trade, and to realise, to some extent, the Darwinian theory of the "survival of the fittest." This will be a time when the most useful and best constructed manufactures will be at a premium, while inferior stuff will not find a sale.

Although I have given patterns for infants' boots, knowing that they will most likely continue to be worn for some time yet, I, nevertheless, set my face against them altogether, as regards their usefulness for infants' wear. Not only are they useless as compared to shoes, but positively injurious. However easy or pliable they may be made to the ankle and leg, they cause a pressure that should never be put upon those tender parts; they weaken instead of strengthening the muscles of the foot and ankle, and consequently retard the power of locomotion. Who can tell to what result this undue and unnecessary pressure upon ankles and legs may lead, not only on the

muscular power, but also upon the nervous system of the infant? I believe it to be one of the primary causes of the weak ankles so common in early childhood, and of not a few of the malformations that we have been accustomed to ascribe to other causes.

CHAPTER VII.

PATTERN-CUTTING.

HAVING dealt with the general principles of patterns, I now come to the consideration of the details of a practical system of cutting them. In this part of the trade the beginner will find that it will be necessary to practice considerably, for although in parts patterns may be worked out by rule, nevertheless there is much that must be left to the educated eye. The student in commencing his studies of pattern-cutting will find himself materially assisted if at the outset he provides himself with a properly cut pattern, say of medium size, of the various kinds he is likely to require. To serve as guides to the eye for outlines in casting new patterns, some of the diagrams issued with the BOOT AND SHOE TRADES JOURNAL will answer the purpose, and will minimise one great difficulty in starting—namely, the work of cutting a pattern to fit a last from a plain sheet of paper. But if the latter plan has to be adopted, the last should be fitted to the exact measure required, and placed upon a sheet of paper in a horizontal position, resting upon one side, with the toe

pointing to the left hand A line should then be drawn with a sharp-pointed pencil from the distance of at least a quarter of an inch in front of the toe of the last, and about the same distance from the sole of the last—if required for machine-sewn work. Another line should be drawn at the back, from the top of the counter or stiffening-part, down to the line below. (I should have observed that it will be most convenient to the beginner, when fitting up the last, to mark on it with his pen or pencil the exact points where he takes the heel measure for the throat of the pattern; also for the instep and joints). When the lines, as above described, are made, the paper should be marked at exactly corresponding points to those on the last; so that no difficulty will be experienced in determining the exact position of the break, or line, in the curve from the heel, represented by D in the diagram (fig. 6). The last should then be removed, and the required length for the kind of boot intended to be made taken from the letter E at the heel to the point of the toe. An oblique line from this point—say 1½ inches, more or less, is next to be cut, and afterwards, the back of the pattern, from the letter E down to the lower line. When this is done, it will be advisable to draw the lines of the joint, instep, heel, and ankle, as marked upon the diagram. After this, the width required to fit the last at each of these points should be measured off; and here the width of sole must guide the cutter. Supposing the sole of the last to be 2½ inches in width, and the upper to cover three-eighths of an inch of the bottom of the last on each side, there would

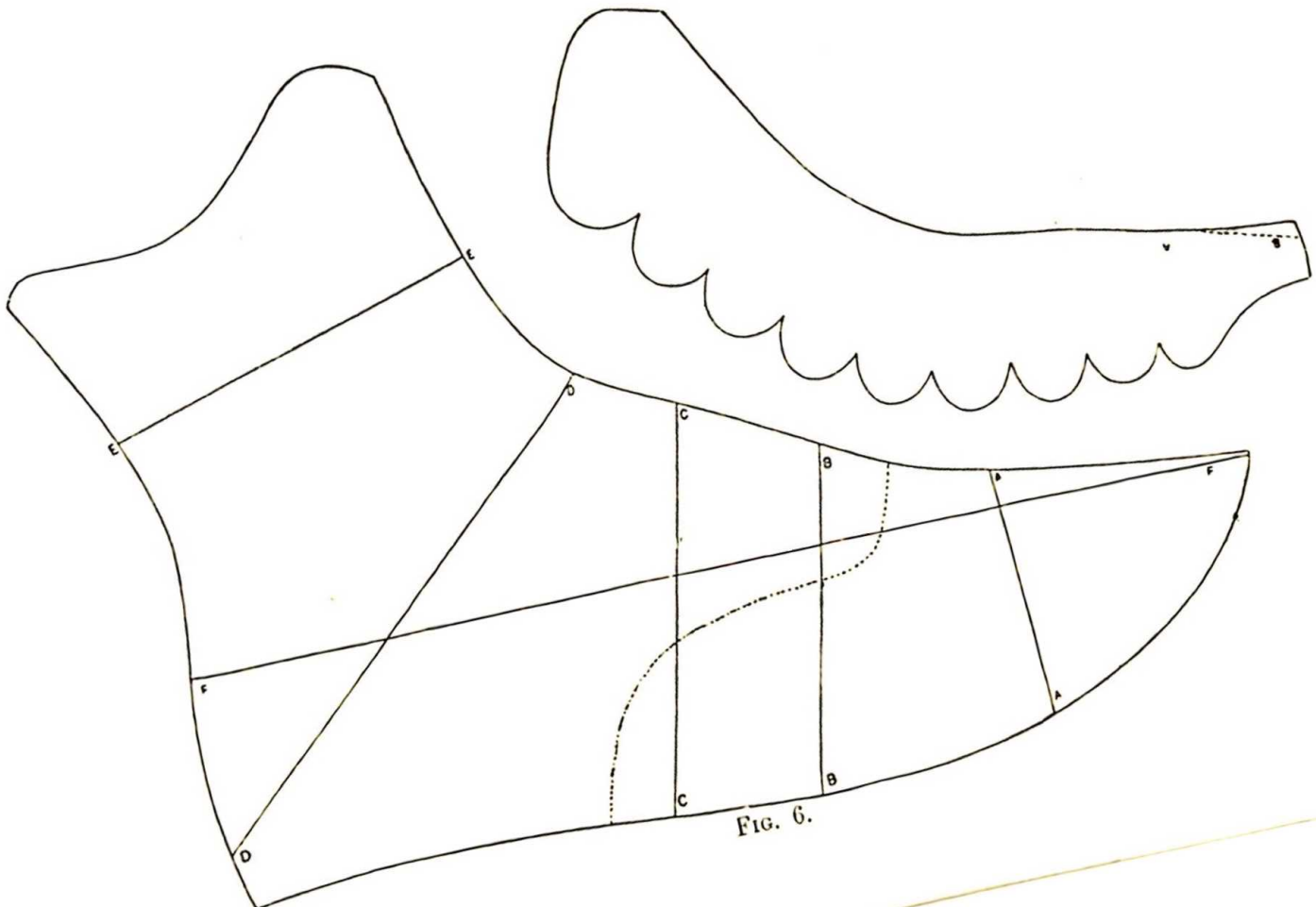

FIG. 6.

be left an uncovered space at the ball 1¾ inches in width. It, therefore, follows that the lining pattern may be cut seven-eighths of an inch less than the actual measurement of the last at this particular part. But it must be understood that a much greater proportion of width of upper will be required for the instep where the waist of the last is so much narrower than the ball of the sole, and where the uncovered space becomes very narrow indeed. The measure for the heel should be taken from ½ to five-eighths of an inch from the bottom line of the seat of the pattern, if for machine sewn, to allow for stiffening and lasting over at the heel, according to the substance of the upper to be cut. But the same measure may be taken ¼ of an inch lower down for hand-sewn work. The pattern may now be cut, care being taken to keep the edge fully out to the measured distance on each line. The rough cast from the plain sheet of paper when cut, should be placed to the side of the last, in order that it may be seen if it is properly adjusted thereto in every particular. But, at the same time, it must be understood that the pattern must not fall dead upon the last at the time for the joint measure. A little ease is required here, and this is given by making the front seam a little less curved than the last itself, thereby making the seam-length from toe to instep a trifle shorter. This will, in the process of lasting, have the effect of putting an additional strain upon the front seam and round the counter, and will give the boot when made up and on the foot the appearance of a clear clean-fitting boot, free from those abominably unsightly

pipes and folds so commonly seen even in boots of a superior quality.

The instructions already given should here be referred to in regard to cutting vamps, also as to adjusting the position of the pattern to the required height of the heel. I may here repeat a caution already given : that is, to avoid raising the toe, or point, of the pattern—a very common, but a very unwise, practice. The line from this point should be continued from two to three inches, so that it falls flat upon the toe of the last. Not only should this be the case in regard to the lining pattern, but it should be equally borne in mind in getting out the covering patterns, especially for those boots requiring patent toe-caps. The closing naturally shortens the front seams, and if they are just to correspond with the position of the lining, it will be found, when the top is put together, that the cap at the toe end is considerably elevated above the lining. This is not only wrong in principle, but it entails a vast amount of unnecessary labour upon the laster to get all the fulness thus caused lasted in clearly around the toe. It is, besides, a loss to the manufacturer, in consequence of the breakages caused by the extra strain that has to be put upon the leather. To avoid all this, the quarter covering pattern should be so marked as to allow the end of the cap to fall at least one-eighth of an inch below that of the lining when fitted.

If a button-piece is required, let it be cut exactly to fit the covering pattern with the width left on for the seam. There is also a very common error to be avoided in cutting

button-pieces. How frequently do we find button boots, and those, too, of a very superior make, with puffy button-pieces, actually destroying the beauty of the boot? This is caused by cutting away too much of the "fly." The object is—what is commonly understood as putting in the draft—to make the button-fly clip close round to the button quarter; but when this is overdone, instead of putting in the draft, it takes the draft, and causes a greater fulness than would be apparent if the fly were not shaped at all. A button-fly is shown in the diagram; the black line upon it will show exactly to what extent the lower end of the fly should be reduced to make the work easy for the closer, and to cause the upper to sit perfectly upon the foot.

In order to get the scollops properly graduated after getting the fly into proper form and size, the number of scollops required should be marked with compasses, giving an equal width to each. The scollops may be graduated by reducing the lower or smaller one in exact proportion to what is given to the larger one at the top. The same rule must be followed with the second and third scollops from the top, by adding to the top ones in proportion to what is taken from the bottom ones. Care should be taken not to make the button-fly so wide as to give it a clumsy appearance, or so narrow that it will look "pimping." The size of the leg will, of course, be the guide in this respect. I have frequently seen on a boot with a small leg a button-fly covering actually more than one half the width of the outer quarter, giving the work (however

correct in other respects) a very clumsy appearance, at the same time causing a considerable waste of leather. These are small matters in themselves, but they, nevertheless, make or mar the appearance of the boots, for where any of these small errors are allowed to show themselves they at once destroy that symmetrical harmony which should exist in every part.

CHAPTER VIII.

TO GRADE UPPER PATTERNS.

THE practical development of any theory, however simple that theory may be, is sure to present some difficulties in its first stages to the student. It should, however, be borne in mind that industry is the "legitimate parent of success." There is a valuable and encouraging lesson in the story told of Dr. Johnson: A young man asked the Doctor if he could give him three golden rules that would guide him successfully through the studies in which he was about to embark. Johnson curtly replied, "Yes! In the first place, Work; second, Work; and lastly, Work." The method of reducing to practical utility the theory of pattern-cutting that I am now describing can be only efficiently realised by attention and continued experiment.

Although I have my own table in regard to the actual widths or measurements required for the different fittings, ranging from Nos. 1 to 5, and even down to a very narrow fitting, called 0's, and have proved its correctness, as far as the London trade is concerned, I have, never-

theless, hesitated to publish it, feeling that my views would not be received as a standard for the trade in general. Everyone looks upon matters of this kind from his own standpoint, and takes it from the class of trade in which he is engaged, the locality in which he is situated, or the particular market for which his goods are being manufactured. For instance, what one would recognise as a No. 3, or easy fitting, in the South or South-Western districts of England, would, of necessity, be called at least a No. 2, or very narrow fitting, in the more northern parts of the country. This dissimilarity will, in time, doubtless be altered through the agency of the technical schools, should they become generally established. The absence of a systematic standard of this kind places considerable difficulties in the way of teaching the elementary branches of the business, such as standard patterns, etc.

The three patterns in the diagram (fig. 7) are what, in the London trade, are called No. 3, or medium fitting, for machine-sewn work, the sizes being 3, 4, and 5.

It should have been stated in the previous chapter that the diagram of pattern given in connection with that article was a wide-fitting one, given by way of change from the medium fitting usually given. This, at the far north, would be considered a No. 3 fitting, while at the south it would be a 5 fitting.

The following explanations as to guaging patterns apply equally to every kind of boot pattern, whether of men's, women's, boys', or girls'. In the first place it will

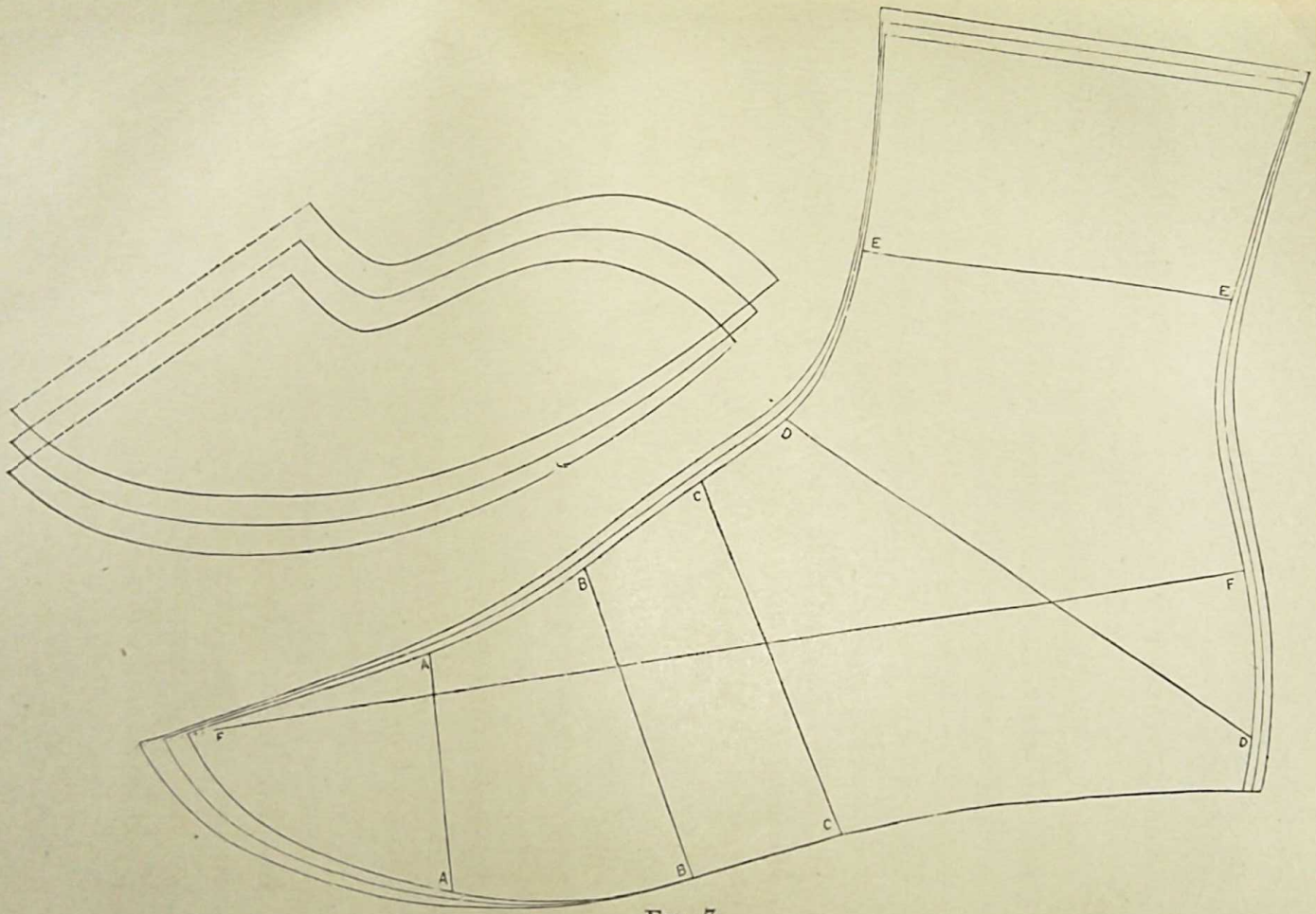

FIG. 7.

be seen that there are two small black dots at the toe of the smaller pattern, at the end of the horizontal line, represented by the letter F, running from the toe to counter. Then follow five other lines, represented by the letters A, B, C, D, and E. The standard pattern can be taken from the 4's size in women's, and 7's size in men's, and the systems reversed to get the smaller sizes. This is very generally done. Some, however, prefer to take the standard for guaging a set from the first or smallest size in the set, but I recommend the former as the safer course for the beginner. The standard, when prepared, is placed upon a sheet of cartridge-paper, and a weight laid upon the pattern to steady it; then, with a sharp-pointed awl, the dots in the toe of the pattern should be pierced through, together with the paper below, so that they may be easily seen in the pattern about to be cut. Then, with a hard, sharp-pointed pencil, a line should be drawn round the toe, both at the top and bottom, from A to A. The pattern is then to be shifted very steadily back until the first hole which has been pierced in the paper below is discernible. In doing this, the pattern should be slightly lowered at the back; this action will raise the toe end, but it should be only so far as to raise the end of the pattern so that the first mark or dot touches the pencil mark just made on the paper. When this is done the line on the top of the pattern should be continued from A to B. The pattern must then be shifted back a little further, until the second mark on the paper is seen. At the same time,

there must also be given a still lower inclination to the heel of the pattern, so as to raise the first mark on the toe to the pencil mark upon the paper. The line at the top of the pattern is then to be continued to the letter C. This done, the pattern must be shifted further back, until there is just upon ¼ of an inch clear from the point of the toe, as pencilled on the paper, and the toe-point of the pattern. The pencil line is now to be continued to the letter D, and up to the top of the pattern. A pencil line should also be drawn along the top of the pattern, which must now be shifted back until there is a clear space of exactly the same distance from the throat of the pattern to the top of 1-12th of an inch. This last shift of the pattern leaves the required additional length of one size on the pattern thus described by the pencil upon the paper. The pencil should next be drawn down the back of the pattern, a little below the ankle measure, as shown by the letter E, and the pattern slightly lowered. The pencil mark may now be continued down to F. The pattern must next be brought down, so that the proper space of ⅛th of an inch is left clear on the instep in that position, so that the point of the toe will continue in a direct line with the letter F. Then the bottom of the pattern should be marked off as far as the line marked C. When this is done, the pattern must be shifted forward, so that the point of the toe just touches the second pierced mark on the paper. The two points at the bottom should now be connected by drawing the pencil at the edge of the pattern from A to C. This will cause

the fulness or wide part of the joint of the larger size, as described upon the paper, to correspond exactly with the standard from which it has been marked. If this is now drawn back to the heel mark, with the bottom of the pattern resting upon the pencil mark below, it will be seen at a glance if the larger size is correctly marked off. This being satisfactorily shown, it may now be cut, care being taken to keep the knife (which should be sharp and thin at the point) just inside, but close to the edge of the pencil mark. I advise the beginner to use this system of marking the size off with the pencil upon the paper, because it gives him a chance to correct it in the cutting, should he have committed any little error in the marking. But the more practised hands will, of course, cut at once, as they shift the pattern after piercing the holes at the toe. The method above described must be continued from the smallest size in the set required up to the largest. But if the standard be taken from the medium size, then all the above movements must be reversed to get the smaller sizes. The best way to do this is, if the standard be, say, a 4's size ladies', then a copy of the same size should be cut and reduced to size 3, by reversing the shifts from point to point, as already stated.

CHAPTER IX.

ON GRADING FITTINGS.

THE kinds of vamps suitable to the different classes of work have been so fully described in the previous chapters that it will be quite unnecessary for me to recur to that matter here, further than to remind the reader that there are two especial points to be considered in cutting the vamp to any single pattern, or to any set of patterns. In the first place, it should be suitably adapted to the kind of boot required to be made from it; secondly, there should be as much style as possible put into the shape, the wings being kept in harmony with the front, and a graceful appearance imparted to the boot when made up. It is sadly to be deplored that, in the general run of English manufactured boots and shoes, there is such a lack of taste; such an absence of harmony in the various parts, evidently produced by absence of artistic skill on the part of the designers. The principal cause of this slovenly and careless way of manufacturing boots is explainable by two reasons. In the first place, there are but few manufacturers, who are practically acquainted with the trade, who

have not made quantity rather than perfection the leading feature of their business. The natural consequence of this is that the word "cheap" becomes paramount in every department, and low salaries are not infrequently allowed to compensate for the want of or to over-ride merit in the managing staff. Secondly, where quantity and gain are the only considerations with the heads of the firm, a more or less corresponding influence of the same nature is sure to obtain among their general staff. Young men, who may be making their way under such circumstances as these are very apt to neglect what are called the minor, but which are really the artistic parts of the business, and attend to those things only which can be got out of hand the quickest. They are thus brought into slovenly habits of work, from which they seldom or ever recover. I therefore repeat that young men should, in all cases, make sure that they start right, and begin at the beginning.

As a guide to cutting vamp-patterns for ladies' work, the three given in a previous diagram will serve for this purpose, the sizes being 3's, 4's, and 5's. These vamps are exactly adapted to the pitch and style of pattern given with them.

The vamp pattern to be correctly cast in cartridge paper must be folded, and marked at the toe, with a sharp-pointed awl, in the same way as the toe of the pattern is marked in the last diagram issued—that is to say, with the two first marks only, the third one not being required for vamps. Another piece of paper is then cast out somewhat larger than the pattern previously cut,

and folded exactly in the centre in the same way. The pattern is then placed upon the paper, and the folded parts laid exactly level with each other. A line is then marked with a sharp-pointed pencil, about 2½ inches—more or less, according to size—round the curve at the end of the toe, and up the front. The marks already made at the toe should now be pierced through and the pattern drawn back until the first mark on the paper below is visible. The pattern should be lowered at the same time, so that the folded part forms an exactly parallel line, the 24th part of an inch from the pencil mark as just described. A line must now be drawn round the curve at the top of the pattern to about half the length of the wing, that is to the centre of the arc from the corner of the curve in the front to the end. The pattern must now be shifted further back until the second mark on the paper is exposed, and the pencil mark continued round the remaining part of the top of the wing, and half-way along the bottom of the wing. The pattern is now shifted forward until the point of the toe reaches the first mark upon the paper, and the two points of the line at the bottom of the vamp connected; the bottom of the vamp will then be completely described in pencil mark, one size larger than the standard. This can now be cut in the same way as has been shown in the instruction for cutting the lining pattern, and the process continued in succession until the set is completed.

When the vamp patterns are cut, the next work is to prepare the covering patterns for the quarters. The

smallest sized lining pattern should be taken and placed upon the paper, with a weight upon it to prevent it from moving. Then with a sharp-pointed pencil a line should be drawn closely round the edge of the pattern. The pattern-cutter may now cut outside the pencil-mark at the back and front—leaving on for seams from 1-16th to 1-12th of an inch, as the case may be, and according to the class of work likely to be cut from the patterns; if for stout, heavy work 1-8th of an inch will not be too much. Ample allowance must necessarily be left for the seams, or the lining will sit in folds when the top is put together. This is a most objectionable error, and one at all times to be avoided. He may now cut the remaining portions of the covering pattern—namely, the top of the leg and the bottom part—inside the pencil mark, and continue in the same way until the set is complete. When these are ready, the smallest vamp should be folded upon the quarter-covering pattern for which it is intended, care being taken at the same time to keep the toe and also the top of the vamp just under the pencil mark describing the seam. A pencil mark should then be drawn round the curve from the centre of the vamp as folded to the end point of the wing. This done, the toe-part of the covering pattern is to be cut off below the line marked out for uniting the vamp, leaving on about three-eighths of an inch, or more or less, as may be desirable according to the substance of the material likely to be used. Due regard should be paid to leaving on what at all times may be reasonably required for strength and the convenience

of the fitter, and, at the same time, all useless widths that would cause waste or interfere with the economy of cutting should be avoided.

Perhaps I had better here refer to what has been already described in a previous chapter respecting the two quarter covering patterns that should at all times be used for cutting buttoned boots. It is well understood that there is no seam required for the outside quarter of a buttoned boot, and a clicker who knows anything of his business will take care to cut his skins so that the inferior or faulty part of the skin shall be cut so that that part which otherwise must be wasted shall go under the button-fly. If, as it so often occurs, only one covering pattern is used, and this one, as a matter of course, has the additional width left on for the seam, it follows that the clicker must either cut away the seam from the intended outside, as it cannot possibly be made to fit properly if left on, or he must leave this to be done by the fitter or by chance. By chance the clicker may, when he finds a very bad quarter, cut a nick in the front, to show the fitter that it is intended for the outside, or button, quarter. In either case it is not only very inconvenient to the cutter, but a slovenly and reprehensible system, unworthy the practice of any man who has pretensions to be a clicker. The mistakes that are constantly being made in this way are a serious loss to the manufacturer, as the fitter is not supposed—neither is it a part of his or her business—to understand the quality of the leather, or to be able to decide in all cases which quarter should be attached to the button-fly or

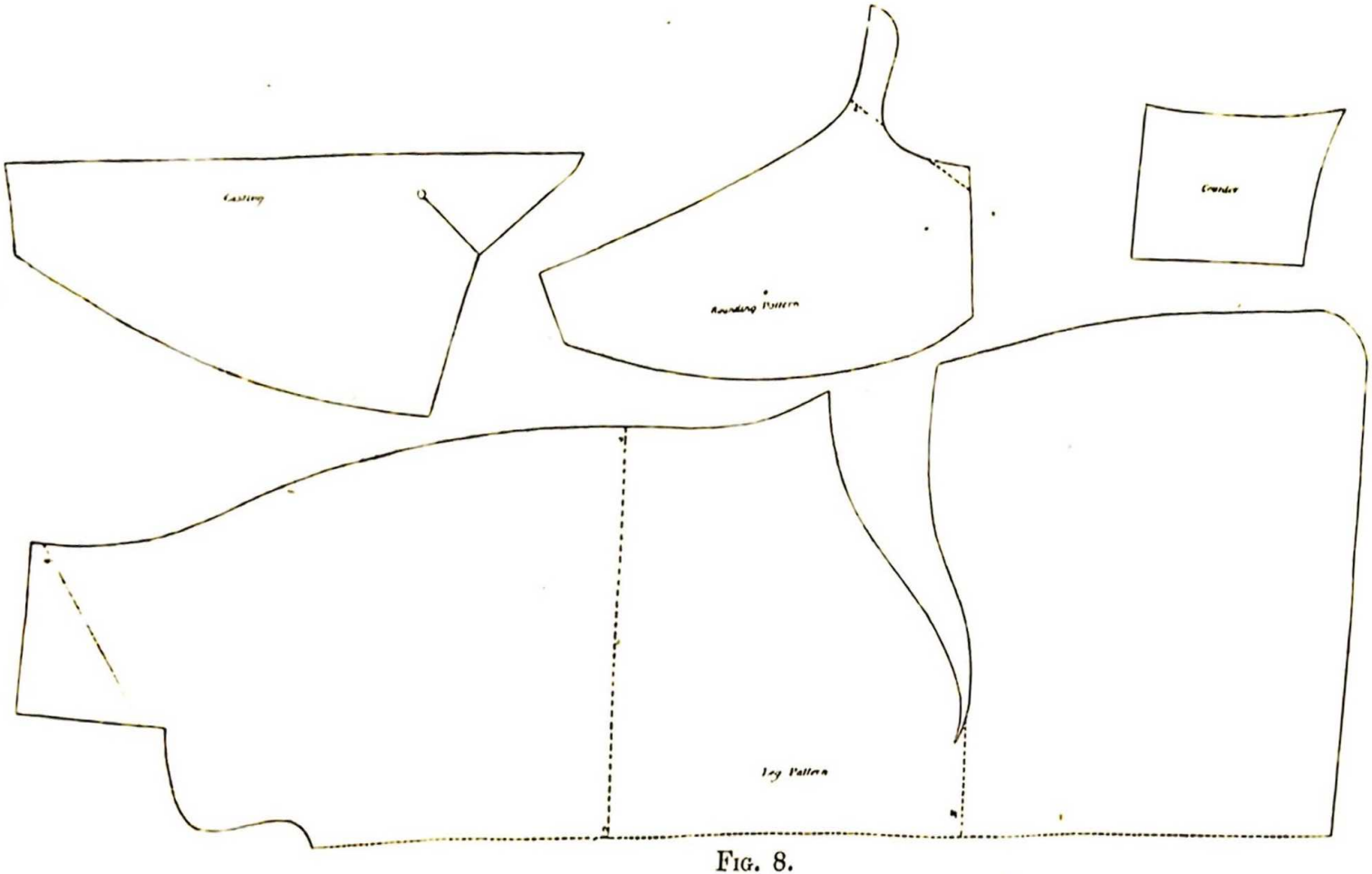

FIG. 8.

otherwise. Where an inferior quarter is put upon the inside of a boot, if it should occur once only, not only is the one pair spoiled, but the value of the dozen, or whatever the quantity may be, is depreciated; therefore this error should be avoided by the provision of two quarter-covering patterns for buttoned boots, one with the seam left on, the other with the seam taken off. The latter should have the corner at the top front of the leg rounded off, so that the machinist cannot possibly make a mistake by closing the button-fly on to the wrong quarter.

In the next place, the button-flys must be gauged. These must all be cut from that side of the button quarter which has the seam left on. They are cut exactly round the edge from an inch or so along the bottom of the pattern at the vamp part, and round the top as far as may be required, the piece at the bottom for the draft being taken off in the way I have earlier shown. Instructions for regulating the width of the fly have been previously given, but reference should here be made to the diagram given with Chapter VII. When the button-flys are all cast out in this way from the set of quarters, the smallest size may be taken and cut to the exact width and shape required; then, before making the scollops, this one may be placed upon the second size, so that the centre of the throat of the one corresponds with that of the other, leaving a little additional length at the top and bottom of the fly of the larger size. Only about the twentieth part of an inch should be left on in width for ladies' boots, and one-sixteenth for men's, to each additional size. This

should all be done in a way to show a corresponding harmony throughout the whole set. The scollops should then be made in the smallest size, and in marking the next size, a proportion left to give additional width to each scollop. This will be done by marking them off with the compasses.

CHAPTER XI.

SIDE-SPRING PATTERNS.

AN inherent objection to anything that gives the least trouble is a prominent feature in the English character; consequently we are, not only as a nation, but individually, prone to content ourselves with whatever is most convenient or likely to give the least trouble. Therefore, whatever fashion may do in the development of new features in the foot-gear of the people, the mere convenience of the side-spring boot, unbacked by any other recommendation, will continue to give it a prominent place in the English market. If this boot is properly cut, and made suitable to the human foot, it is easy to put on, and as easy to pull off, and, taking it altogether, I should say it is the most convenient as well as the smartest kind of boot ever invented. When they were first introduced, nothing would take but elastic sides, and the shops were crammed and the markets glutted with every conceivable variety of side-spring boots in the most fantastic forms. Some of these boots were so cut that they could not be pulled on the foot; others would

not come off. Some elastic used therein would stretch fourfold and some would not stretch at all.

The anxiety of manufacturers to get into the market with cheap goods, coupled with the unbridled competition of the elastic web manufacturers, produced such a quantity of unmitigated rubbish called "elastic," that the side-spring trade was not only destroyed, but the manufacturers themselves were ruined into the bargain.

As this branch of the trade, with all its drawbacks, is likely to improve under the present more healthy state of the elastic web trade, I will now direct the attention of the reader to the patterns to be used in the manufacture of side-spring goods.

"Anybody can cut a side-spring boot" has been a very common saying in the trade, implying by the sense in which it is used that little or no practical experience is required in cutting this class of work. Doubtless, this remark has some foundation in fact, if a very large proportion of the work which has been brought into the market from time to time is to be considered as representing side-spring boots. But it is altogether a mistaken idea to suppose that a pattern of this kind can be cut so as to answer the purposes of the wearer, unless the cutter is thoroughly master of his business. One fatal error in side-spring boots has been that they are cut too close round the ankle, causing considerable discomfort as well as injury to the wearer, by checking the natural flow of the blood to the extremities. Not only does it do this, but this tightening round the ankle at the same time destroys

the fitting properties as well as the appearance of the boot when on the foot. The top part of the upper drops into a fold at the top of the stiffening, thereby preventing the heel from settling back fairly into the heel of the boot and throwing the first bearing of the foot upon the breast of the heel instead of the centre; whilst at the same time it gives a very unsightly and clumsy appearance.

It is well known by all pattern-cutters who have studied their business that there is as much care and judgment required in cutting a side-spring as there is in that of any other kind of boot. The end and aim of all practical cutters is to give style to the boots, together with convenience and comfort to the wearer. Attention to the following rules will enable the student to avoid the errors above enumerated. In the first place cut the pattern up to a fairly taken measure, and give an exactly upright position to the boot when made up. Secondly, do not cut the spring too wide, so as to look clumsy, or too narrow, as that will interfere with the boot being put on and taken off with perfect freedom. Care should be taken at the same time to leave an equal width of upper at back and front at the top of the leg, bringing down what will appear a straight line on each side, nearly to the bottom of the spring, which should there be crescent-shaped; the bottom of the spring should be brought as far forward as appearance will admit, so that the front line of the spring retains an upright position. By doing this the full freedom of the action of the spring is secured. If, for example, we take a lady's 4's size, easy

fitting side-spring boot, the ankle measuring, say, 8 inches, the top of the spring should not be so wide as to cover quite a half of the width of the quarters. A breadth of $1\frac{7}{8}$ inch at this part will be ample for all general purposes, thus leaving $2\frac{1}{2}$ inches of upper. This must be graduated downwards to within a quarter of an inch of the bottom, where a neat crescent should be cut, measuring three-quarters of an inch across. It will be also necessary to give special attention to the depth of the spring. For the kind of boot above described, the distance from the edge of the sole (that is, supposing the sole to be of average width) to the bottom of the gore should measure, at least, $1\frac{1}{4}$ inch. If cut lower down, it is apt to sit loosely, and feel uncomfortable when on the foot. On the other hand, if the spring is not cut down to about the point named above, it will give trouble in pulling on and off. A spring cut to the above proportion will give a neat and genteel appearance to the boot, and will answer for most kinds of side-spring boots, whether women's, children's, or for men's militaries.

In boys', youths', and men's goloshed work, the depth of spring is regulated by the depth of the golosh. This also is a matter where some system must be observed to avoid the difficulties previously enumerated. For a man's machine-sewn boot—say size 7, medium fitting, with an ordinary width of sole—the golosh pattern at this part of the boot, where the spring is covered, should measure exactly 2 inches; but in all cases where a very wide fitting is required a greater depth of golosh (in proportion) must

be allowed, so as to harmonise with the other parts of the upper. The depth of the vamp pattern most suitable for the boot will be $4\frac{1}{4}$ inches. If this is cut with a moderate degree of curve in the top front, this depth will be sufficient to clear the inside or big toe joint—a very sensitive part—and will give a neat appearance to the foot. If cut lower, it will look dumpy, and be uncomfortable to the wearer. If higher, it will be difficult to last down into the break of the foot, forming very uncomfortable pipes or folds across this part.

CHAPTER XII.

LONG WORK.

IN my early days I well remember what a point of distinctive merit was the art of cutting top boots, or what was called "long work" generally. Every country apprentice, who had any ambition at all, would try to reach this point. To cut, close, and make a jockey boot was the test point of the aspirant's abilities, and success in this respect would override every other disqualification. At that time the ability to cut "long work" at all creditably was of considerable importance to apprentices in country towns and villages, when every tradesman, farmer, or, indeed, any one in any position above that of an ordinary labourer, and even some of these, would have top boots for Sunday and holiday wear. At that time the higher class of work, such as thigh boots, were only made for fishermen and those whose callings necessitated standing in water. Dyers, for instance, usually wore boots which reached over the knee-cap. I may here state that, although the art of cutting "long work" is at present known to very few in the trade, it is very easy to be

understood. There is one plain and simple rule to guide the student through the whole range of "long work," whether jockeys, Napoleons, or thigh boots, and whether light for the huntsman, or stout for the mariner. In a previous article upon taking measures for "long work," which should now be referred to, I stated that the length, joint, instep, and heel measures are taken in the same way as for all other classes of work. After this, the measure is taken round the thickest part of the calf, and from the centre of the knee-cap down into the waist of the foot.

When the last has been fitted up in accordance with previous directions, a sheet of paper should be taken, large enough to meet whatever length may be required above the knee, and this should be folded in the centre. A measure should then be taken from the bottom of the sheet at the folded part, up to the exact height required for the centre of the knee-cap. This is denoted by the letter E on the diagram (fig. 8). The usual height for a 7's size at this point runs from 19 to 20 inches. It will be observed by taking the range of the pattern, that there is a considerable difference in the length measurement between the back of the boot and the front. This, of course, will appear obvious to every one, as the front is brought down under the arch of the instep into the waist of the boot. A horizontal line is made from the letter E to the full width required for the top or thigh part, and a second line is drawn at the point where the measure is taken for the most prominent or thickest part of the calf, as shown in the diagram, from C to D. Let this be

continued only so far as may be required for the measure at this part of the leg. This line must be regulated entirely by the kind of boot to be made from the pattern. The pattern from which this has been reduced is a full free fitting for a medium size boot, and one which could be worn outside or inside the trousers. It measures at the calf 16 inches, thus allowing 2 inches for the seam and trousers; the average measurement for 7's size at this point being 14 inches. The measure for the heel is next taken in the direction of the line from A to B. I have found that learners frequently experience great difficulty in deciding upon the exact point of the throat for this kind of boot. To aid them in the matter I have suggested that an ordinary button or balmoral pattern, of the size of heel required, should be placed upon this part of the long pattern, ranged in a proper position with the counterpart. The adoption of this method has proved a very helpful guide in this the most difficult part of the student's work. The average measurement of heel for this size is $12\frac{1}{2}$ inches; but, in all cases, the pattern should be cut up to the measure at this point, with all the additional allowance for seam (if closed inside), for counter, and for sewing away at the seat. A very large margin will be required for a stout hide leg. The required amount can be correctly ascertained by taking the exact heel measurement of the heel of the pattern given, that being intended for such a class of work.

The heel, the calf, and height of the leg being marked off, the leg may now be cut from a point 2 inches below

the top line, forming a point ½ inch wider than the width marked off for the calf, but nicely graduated down to this point, and continued downwards, according to the outlines of the pattern given, to the seat, and contracted slightly at the top of the counter to prevent that "bellowsing" fullness frequently seen round this part of the foot. The foot must range in the same position as the pattern given, according to length or size required. The tongue may be cut in any artistic shape that fancy may dictate for the higher classes of work; but, for this heavy kind, the plain tongue is preferable, as being more solid, as well as more suitable. The casting pattern must also be in proportion to the one given. The counter pattern must not be over 3 inches in depth. The gore has next to be taken out from the point of the letter E, about 1¾ or 2 inches, according to width of leg, and in a curved line, the same as marked out in the diagram, making a space of two inches at the back. In order to get at this correctly, and so as to get the lines accurately formed for closing together, the bottom should be cut first, and then the top of the pattern pulled down under the leg to a distance of two inches at the back. The next process is to cut from the point at the knee-cap close to the edge just previously cut; and the pattern-cutter may then draw out the pattern at the top to the size required, and in similar shape to the one now given. It is usual in this kind of boot to put in a double front. Where this is done it will be necessary to block the lining as well as the covering part. The lining is stitched in round the tongue, outside the closing

seam. These heavy boots are frequently made without any top linings.

There are other classes of high boots, of a much lighter make, of enamelled or patent leather, and sometimes of levant. Some of these are cut in the same way as the above, with closed back seam ; but they generally have outside counters; whilst there are others made for hunting and like purposes which are just hemmed together at the back, and have an outside counter and back-strap. These, of course, must be cut to fit fairly close to the calf, as they are always worn with breeches.

I now come to what is called the knee-boot, or Napoleon. Many of these boots are made up in the manner I have already described in regard to the thigh boot, and from the same kinds of leather; consequently they must be cut by the same rule; but the cutter must never forget to make ample allowance for the seam where very stout leather is to be used. These boots are frequently worn with trousers. Where this is intended to be the case, it is desirable to cut them an inch lower at the back of the leg ; unless this is done, the folds of the trousers make them uncomfortable to the wearer. The usual height for this boot at the back, for 7's size, is about 15 inches. The leg is elevated at the front from $2\frac{1}{2}$ to 3 inches, and is cut so as to form a graceful curve from the front to the back of the boot.

The jockey—or what is more commonly called now, the coachman's boot—is cut upon the same principle as the above, but with the addition of a coloured top. The tongue of this boot is much narrower than those above mentioned,

is more artistic in shape, and is brought up to a very narrow point at the top, so much so that the thread of the seam of one side almost touches that of the other side. And here, indeed, the utmost care is required; not so much in cutting the pattern, but in cutting-out the aperture into which the tongue is to be closed. It is not usual for those who are in the habit of cutting this class of work to use patterns at all. They take their straight-edge rule and cut from the leather direct, but I should not recommend this as a safe method to the beginner. The aperture that is cut from the front of the leg, where the tongue is to be closed in, must be at least a quarter of an inch lower than the top point of the tongue, so that it may lap over that much. There must also be left at least 1-16th of an inch on each side of this aperture for the tongue to cover. This is left in order that the closer may have something to ground his flat seam upon. He has to skive or bevel off this edge up to where the edge of the tongue will fit, and this he also has to do at the top of the tongue; the seam is thus protected as well as strengthened. In closing, the awl is passed through the middle of these edges, and so the flat seam is formed. The counter is about $2\frac{3}{4}$ inches in depth, with a point left on at the back from 1 to $1\frac{1}{2}$ inch; the back-strap is joined to this and continued up to that part of the leg that is covered by the top, and sometimes to the top of the leg. The height of this boot for 7's size is about 15 inches, unless, as in some cases, it is required to "bellows" in the leg; then about $1\frac{1}{2}$ inch extra is left for that purpose. The leg

itself is only 14 inches: the extra inch is formed by the outside coloured top being turned in a full inch and joined at the top of the boot leg, thus making the height 15 inches. This top must be cut 7 to 7½ inches in depth, leaving 6 or 6½ inches when turned in. The top must be cut half an inch larger than the leg, to allow for seam and to admit of its going freely over the outside of the boot.

It must be borne in mind that care must be taken to cut all work of this class so that it maintains a perfectly upright position when made.

CHAPTER XIII.

TO CUT SHOES.

WHEN we look back a quarter of a century and note the changes that have followed so rapidly one upon the other—first as to the method of putting the tops together, then in the art of constructing the bottoms, and view the trade in its present state, with all its mechanical appliances, its vast productive power, and think of the prices at which some of the goods are manufactured, the transformation is seen to have been so great that one is almost inclined to question its identity with the same trade as formerly. These changes have caused a great division of labour, and many men have been brought into it to undertake but a single branch. These men have consequently had little or no opportunity of acquiring a knowledge of any other part of the work. It is also a fact much to be regretted, that, as a rule, these artisans have been content with a very imperfect knowledge of their particular branch, and have preferred to do that in a slovenly and unworkmanlike manner, rather than take

advantage of the opportunities that arise, which would give them a more general knowledge of the craft. To be sure there are some exceptions; these are few compared to the large number of artisans employed. This state of ignorance and indifference is, however, assuredly waning. Later it must die out. The numerous opportunities that are now offering themselves for a better and a more thoroughly practical knowledge of the art of boot-making will be appreciated and applied by the better educated youths who are coming into the business.

Many disadvantages arise through this division of labour where one man performs only one particular part of the work, and is most likely uninstructed in that. This is a matter to which I am anxious to draw the attention of the young student who may be following me in the art of pattern-cutting. It is of all things necessary that he should thoroughly understand the art of lasting, as well as of cutting patterns.

In days gone by, when the shoemaker would cut, close the tops, make up the work with his own hands, and see it on the customer's foot, he was able to watch it in every stage; he could detect any little error, either in cutting, fitting-up the last, or in the process of making, and could then use his brains and think the difficulty out to a final solution for future guidance. The case is very different now: there are very few pattern-cutters of the present day who understand the practical part of making up a boot or shoe, and there are but very few lasters who understand the proper method of lasting a shoe. Indeed

I may safely add that I should not be exceeding the bounds of truth in stating that, in the whole of my experience, out of the many hundreds of hands that I have engaged at different times I have not met with a dozen who could last a shoe as it ought to be lasted; I have had to teach nearly all—that is to say, all who were teachable. Give them the best-cut shoe it is possible to produce—and they will spoil the sit of the quarter, and then very coolly, and, in many cases, very innocently, throw the blame upon the pattern-cutter, who must, of course, submit to the discredit if he is not able to discover and point out how the error has arisen. Usually this is through the quarters being pulled down too much at the corners of the heel and being lasted too tightly in the waist, and with the outside made tighter than the lining. The consequence is that shoes gape at the quarters, are very unsightly in hand, and are loose and uncomfortable upon the foot. The majority of the boots that are made are dragged down far too much in this way; but, owing to the upper being tight over the instep of the last, the folly of this stupid practice does not show to the extent that it does in the shoe. Nevertheless, this excessive dragging should be avoided in any case, both in ladies' and gentlemen's work.

A great deal also depends upon the fitting properties of the last upon which a shoe is made. The pattern may be correct and the upper properly lasted, but if the last is not constructed so as to catch the general bearings of the foot without pressing unduly upon any part of the upper, the whole thing is a failure. The artistic merit of the pattern-

cutter and the practical ability of the laster are thus entirely thrown away, simply because the foundation upon which the article was built was not in harmony with the conditions and requirements of the foot. It will therefore be apparent to the mind of the student in the art of pattern-cutting that this also is a matter in which he is eminently concerned, and in which he should be thoroughly instructed, more especially as he is liable at all times to be saddled with the discredit of any or all the failures that occur. If the pattern-cutter should be able successfully to defend his part of the business, the blame will then most likely be shifted on to the fitter, who then becomes the scapegoat: anybody but the right one. It is at all times amusing to see what subtle ingenuity is employed to shift the faults of the guilty on to the shoulders of the innocent.

The pattern-cutter must, in the main, be guided by the character of the last upon which the shoes are to be made, although their deficiencies may in some degree be modified by careful attention and a knowledge of what is naturally required. Patterns for lace or button shoes should be brought well up on the instep and at the back of the heel. Suppose the pattern required should measure $11\frac{1}{3}$ inches from a supposititious point, A, at the point of the toe, in a straight line to another one, C, at the thickest part of the heel—that is, about half-way up the back of the quarters—the top point of the instep should be brought up to a perpendicular line from the letter B, resting upon the horizontal line six inches from the point of the toe.

There is a very easy and simple method of getting shoe patterns from the sets of boot patterns. Select the length and width of whatever fitting may be required; cut from this the exact length, taking care to drop the shoe pattern gradually from the joint to the top of the instep to the width of one-eighth of an inch, and sink the bottom of the pattern from the joints through the waist in a straight line to the lower point of the heel. This done, cut the curve from point to back at the top of the quarter to the depth required. This should be very carefully done, so as to form a graceful graduated curve when on the foot. If the operation is done in a slovenly fashion—as it so frequently is—it imparts a very clumsy and unsightly aspect to the general outlines of the shoe, and in fact spoils its appearance, however well it may be made in other respects. Symmetry and taste should be perceptible at every point.

The next thing is to cut away three-sixteenths to a quarter of an inch from the top of the quarter at the back, graduating this down to a hair's breadth, just below the letter c at the centre of the back. The distance for the vamp must be marked, and this should be also cut according to directions given in a previous chapter. Then the folded vamp should be placed on a level with the toe point of the pattern, and a mark struck with a sharp-pointed pencil, describing the top of the vamp upon the quarter.

The next operation is to cut away the front, or toe-part, of the pattern, to within a quarter or three-

eighths of an inch (as the case may be) of the line thus made, and the pattern is complete. This method may be continued throughout the sets, and is common to all classes of work.

CHAPTER XIV.

CONCLUSION.

I AM now brought to the closing chapter of this treatise, and it would not be out of place here to take a retrospective glance at the ground which has been travelled over. In the first place, I endeavoured to lead the mind of the reader into a wider field of study and observation than has hitherto been opened to the boot and shoe trade, and showed that a purely mechanical skill is not all that is required to make a man master of this business, but that, at least, an elementary knowledge of physiology, in its relation to the anatomical construction and natural functions of the human foot, is of the first and highest importance. Moreover, I have no hesitation in making the broad declaration that every one destitute of this knowledge is working in the dark, and can never be master of his business. This applies not only to the fitting-up of lasts and the preparing of models, but to the pattern-cutter, the maker, and even to the fitter. The first five chapters of this series dealt principally with the anatomical part of the question, and, although so vastly important a subject, is noticed in a

merely superficial manner; nevertheless, there is sufficient matter to lead the mind of the student to a deeper and more comprehensive consideration of the question.

Then followed a method for fitting up lasts for bespoke or hand-sewn work, with the preparation of fittings for the same, which of itself would be of considerable advantage to all who practise it. The time usually wasted in this respect for want of a simple method or arrangement forms a serious item in the actual cost of the product. This is one of the reasons for the constantly reiterated cry that "bespoke work never pays."

The preparation of models of the various widths for men's, women's, and children's work, suitably adapted to the natural requirements of the foot, has also been dealt with and explanations given, so that the boots and shoes when made upon them might be worn with comfort and have a smart and genteel appearance on the foot; meanwhile being capable of retaining their shape until worn out. The shaping the soles suitable for all these kinds of boots of the different widths, in perfect harmony with the models and the art of gauging them into sets, with a corresponding margin from the inner sole, according to the substance of the upper, has also been explained.

The diagram given with a previous chapter, with the lines marked for measuring the different parts of the foot with accuracy, together with the accompanying instructions setting forth a systematic method for the proper management of this part of the business, cannot fail to be useful. Where this method is practically followed a great

deal of the worry and disappointment that so frequently accompanies the manufacture of bespoke work may be avoided. Then followed the instructions for pattern cutting. The method was explained of cutting a pattern from a plain sheet of paper to fit a last of any dimensions, and also for gauging patterns into sets. In doing this, I have, I believe, noticed nearly every class of work, as well as every grade, from infants' up to men's and women's. I have endeavoured to give this detailed instruction to my readers in the plainest and most simple manner that I could employ.

I stated at the commencement of this series that the methods I teach are not mere theories, but the result of many years' practical experience. I may add that they are in great part original—that is, so far as the picking-up of disjointed scraps of observation and reducing them to shape and form can be called originality. That some, at least, of the methods I teach run counter to the preconceived notions and practice of many who are considered to have a standing in the trade, I know to be the case. I only ask (and this I do in full confidence) that those who question my theories as set forth in these papers will give them a fair trial, and I have no fear for the result. In fact, I ask every one to do as I have done: that is, to test them by practical observation, and the result will prove whether they are founded in error or not. I have considerable reverence for that old trite injunction to "prove all things, and hold fast that which is good."

THE END.

LONDON:
PRINTED AT THE OFFICE OF THE "BOOT AND SHOE TRADES JOURNAL,"
11, HOPE BUILDINGS, BOOKSELLERS ROW, W.C.